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ABSTRACT

This report contains a compilation of manpower statistics describing the education and employment of bioscientists. The tables also include data from other major disciplines to allow for comparisons with other scientists and nonscientists. Bioscientists include those with degrees in anatomy, biochemistry, biophysics, genetics, microbiology, pharmacology, and physiology. Chapter I presents the background of the study and the selection of academic fields included in the study. Chapter II deals with: (1) the educational patterns of bioscientists in terms of enrollment and degrees, institutions and staff, students, and expenditures for training support; and (2) the employment patterns of bioscientist in terms of type of employer and type of primary work activity, salary, and expenditures for research. The last chapter presents an annotated bibliography source documents. (AF)

# EDUCATION AND EMPLOYMENT PATTERNS OF BIOSCIENTISTS

## A STATISTICAL REPORT

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Prepared in the Office of Scientific Personnel of
National Research Council

Under the sponsorship of the
National Institute of General Medical Sciences
National Institutes of Health

HE002 648

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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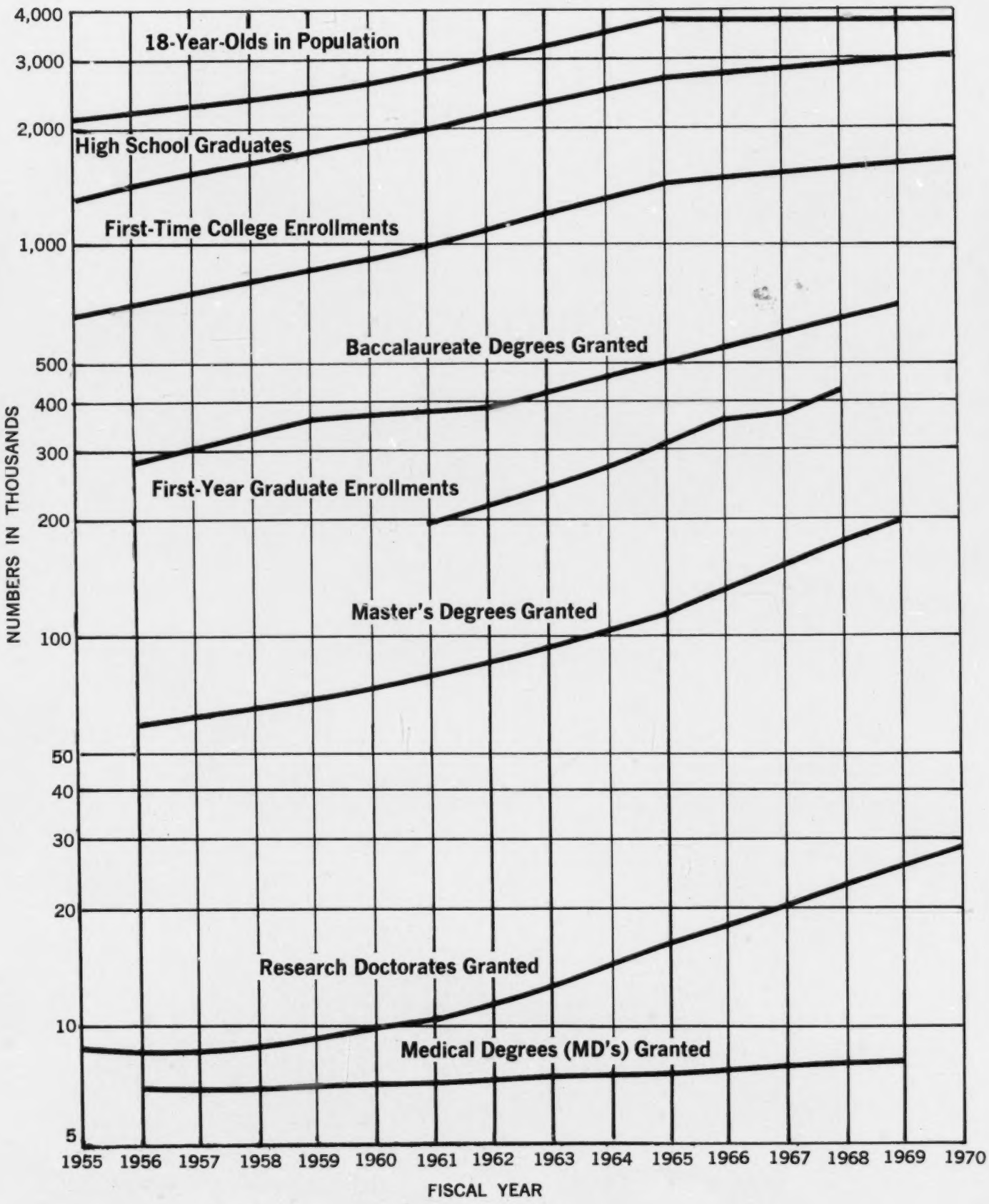
## SUMMARY OF TRENDS IN EDUCATIONAL STATISTICS



# FOREWORD

This report contains a compilation of manpower statistics describing the education and employment of bioscientists. In order to allow for comparisons with other scientists or with nonscientists, the tables also include data from the other major disciplines.

The purpose of the study is to present objective data, collected from a variety of sources, which provide useful information for policy-makers and a broad frame of reference for further, more detailed manpower studies. Such a background is necessary to those who must evaluate trends in the education and employment of bioscientists including trends in those fields receiving training support from the National Institute of General Medical Sciences. In addition to compiling data that are readily available, the report identifies several major data gaps where information is not available or not readily and regularly available.

Guidance for the study was provided by an Advisory Committee composed of bioscientists and mathematical sociologists who suggested areas of data collection and reviewed the resulting report. Members of the Committee are:

JOHN A. D. COOPER, *Chairman*, Association of American Medical Colleges
HAROLD J. BLUMENTHAL, Stritch School of Medicine, Loyola University
WARREN O. HAGSTROM, University of Wisconsin
ROBERT W. HODGE, University of Chicago
ALLEN LEIN, University of California (San Diego)
J. F. A. MCMANUS, Federation of American Societies for Experimental Biology
GERHARD W. E. PLAUT, Rutgers, the State University

Staff members of the Office of Scientific Personnel compiled the data and planned and wrote the report. Those most closely associated with the project were:

FRED D. BOERCKER, Director of Educational and Employment Studies, who served as staff officer for the project
CLAREBETH MAGUIRE, Manpower Publications Coordinator
EDNA H. NIVEN, Administrative Secretary
HERBERT SOLDZ, Manager, Data Processing Section
GEORGE BOYCE, Manager of Systems Analysis
INGRID MEIER, Senior Programmer
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Shortly after the manuscript for this report was completed, Dr. Boercker left the staff of the Office of Scientific Personnel to return to college teaching. Supervision of the final writing of the report was provided by Lindsey R. Harmon, Director of Research.

Dr. Solomon Schneyer, Chief, Program Analysis Branch, National Institute of General Medical Sciences, served as the NIGMS Project Officer, and he also provided helpful suggestions during the course of the study.

The National Institute of General Medical Sciences provided funds in support of the study and for publication of this report. This assistance is gratefully acknowledged.

It is hoped that the report will serve as a useful and timely source of basic data for those concerned with the planning and support of advanced education and with the employment of bioscientists.

William C. Kelly, *Director*
*Office of Scientific Personnel*

FEBRUARY 1, 1971.

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CHAPTER I

# INTRODUCTION

### *Background of the study*

This study is a follow-up of an earlier evaluative study of the training programs of the National Institute of General Medical Sciences (NIGMS) which was conducted by the National Research Council for NIGMS.[1] One result of the evaluative study was an impressive collection of data describing both the academic departments and the trainees and fellows receiving NIGMS support during the period FY 1958–1967. Such data continue to be collected and are now available through 1969. However, interpretation of these NIGMS data was often difficult because time-trend statistics describing the education and employment of all bioscientists and other scientists were not readily available for comparison. The primary purpose of this study was to collect such reference statistics from various sources and to present them in a convenient set of tables for ready reference and for future evaluative studies. Chapter 2 of this report contains tables of statistical information describing the education and employment of bioscientists. Policy decisions affecting higher education are made not only by universities but also by government agencies, professional societies, and industry, and such decisions should be based on reliable, objective information. Recently, policies concerning the education and employment of PhD's have received much national attention in connection with the draft, Federal financial support for research and for fellowships, and the alleged overproduction of PhD's. A second purpose of this study is to assemble manpower data which would provide background for those who make policy decisions in such matters.

Although bioscientists are the group that is treated in greatest detail in this study, the data collection was not limited to these fields. The tables list information for the other natural sciences and, in most instances, for all doctoral fields, thus providing a broad reference background for the bioscience data. Because the data do include all fields, the statistics in this report should be useful not only to the NIGMS and to bioscientists but also to specialists in many other disciplines.

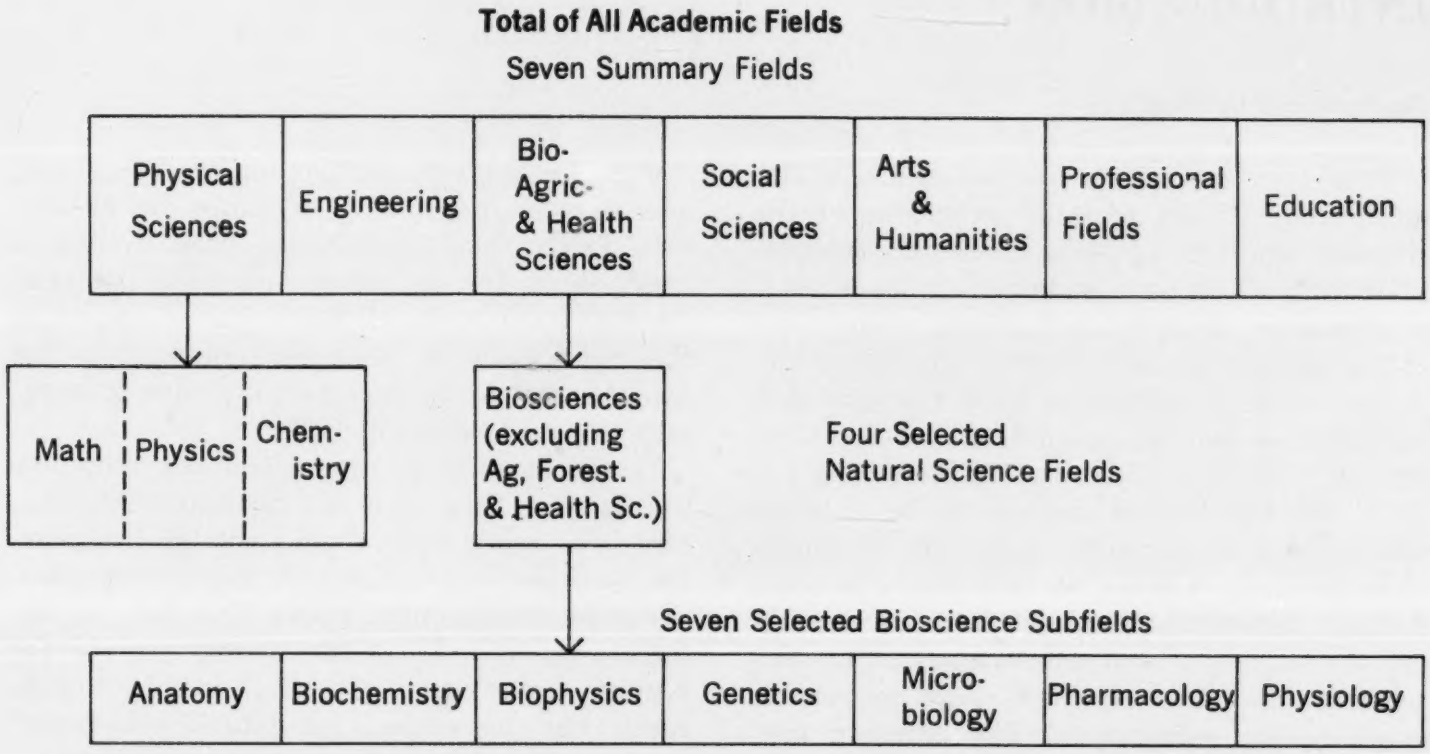
If education and employment statistics are to be useful, they must be kept reasonably current. The trend lines should not lag the present by more than one or two years, if the data are to be of maximum value. Therefore, a statistical report such as this should provide for regular updating to forestall rapid obsolescence. For this reason, the data in this report come primarily from sources that *regularly* report statistical information in published form. For example, the Office of Education annually publishes *Earned Degrees Conferred* and the National Science Foundation biennially reports on *American Science Manpower*. A number of government and private agencies have data files containing important information, but these were not included in this report because the data are not made readily available to others for updating of information. It is hoped that this publication will call attention to important data gaps and that agencies which collect such data, but do not publish regularly, will be encouraged to do so in the future. Those who wish to update statistics in this book may do so by subscribing to the publication series described in Chapter 3.

### *Selection of Academic Fields for Inclusion in The Study*

The tables and figures in the following chapter present data which describe education and employment patterns in the various academic disciplines or fields. Most of the tables are so arranged as to present data by field, with the

[1]National Research Council, 1969 *Effects of NIGMS Training Programs on Graduate Education in the Biomedical Sciences* Washington; U.S. Department of Health, Education, and Welfare

fields organized according to the following plan:




Statistics for the seven summary fields provide a very broad perspective and allow for comparisons between trends observed in the sciences and nonscience fields. The fields of mathematics, chemistry, and physics are the largest of the physical sciences and provide appropriate comparisons with the biosciences. As used here, "biosciences" exclude agriculture, forestry, and the health sciences, which are, however, a part of the parent summary field. The seven selected bioscience subfields were chosen to be representative of the much larger number of fields supported by NIGMS, and they are long-established categories both within NIGMS and in the Doctorate Records File of the Office of Scientific Personnel, from which much of the material in this report was extracted.

Because of the close relationship between the development of the biomedical sciences and the practice of medicine, Table 6e has been included to display data for medical schools and numbers of MD's graduated.

In order to help the reader comprehend quickly the large amount of detailed information, titles have been kept succinct, and a uniform style of data presentation has been adopted throughout the chapter. Each topic is introduced by a numbered figure which generally displays graphically a time trend for a given characteristic based on the total population of interest. The figure is followed by one or more tables which provide detailed information for various subgroups of the population. Each table is numbered to correspond with the appropriate figure. If more than one table is required for the topic, alphabetic subscripts are added to the table number—for instance, Table 4a, Table 4b, etc. All tables contain references to the primary source, and notes at the bottom of the tables state definitions of any unusual terms used in the tables.

The written text accompanying the data has been kept minimal. It consists of brief statements pointing out the principal trends or patterns of the data. In this way it is hoped that the reader will be able to review general trends by use of the figures and summary statements and to study detail, when needed, in the tables. Detailed interpretation of the significance of the data lies outside the scope of this report and is left for the reader. To illustrate, the

frontispiece brings together on one page eight basic data series for some or all of the years 1955–1970. These eight trend lines, representing 18-year-olds in the population, high school graduates, first-time college enrollments, baccalaureate degrees granted, first-year graduate enrollments, masters degrees, research doctorates, and medical doctorates are graphed on semi-logarithmic paper to facilitate comparison of time trends. Each of these data series is further developed in the text, tables, and graphs of the following chapter.

**CHAPTER II:**

# EDUCATIONAL AND EMPLOYMENT STATISTICS

Educational patterns of bioscientists
- Enrollments and degrees
- Institutions and staff
- Students
- Expenditures for training support

Employment patterns of bioscientists
- Type of employer and type of primary work activity
- Salary
- Expenditures for research

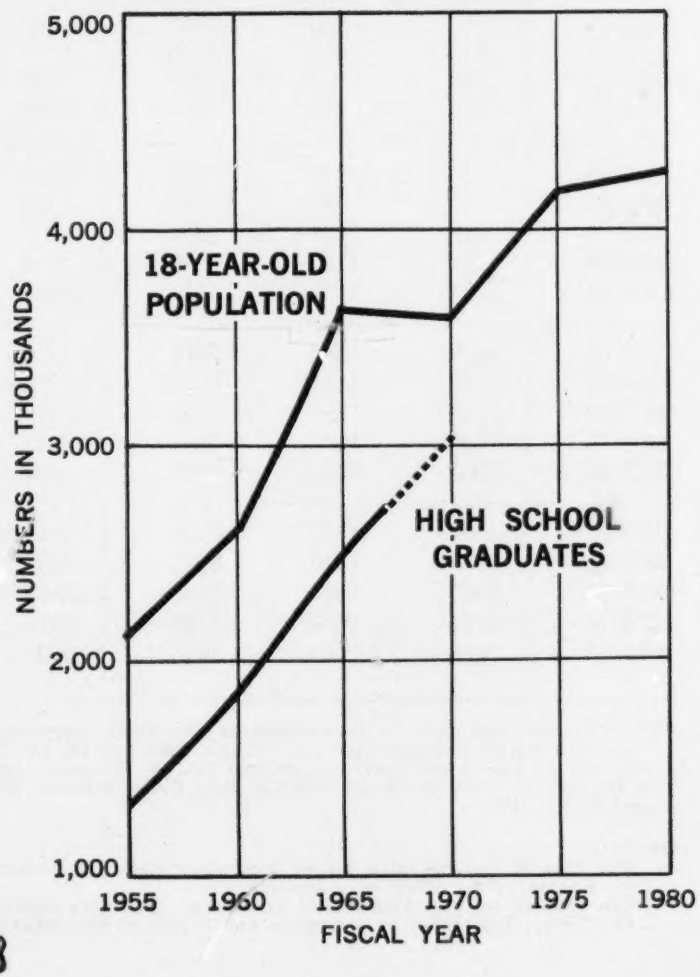
Data in the first section of this chapter describe educational patterns of bioscientists, from high school through postdoctoral training, comparing them with other scientists and with nonscientists. The statistics also point out the changing pattern of financial support for higher education. Information describing the postdoctoral careers and employment patterns is presented in the second section of the chapter. In general, the employment data have been restricted to information about research doctorate recipients because this is the only group for whom reasonably complete and reliable data are regularly published. Although the emphasis throughout is on bioscientists, comparative data are included for other major science groups and for selected nonscience groups.

The data were collected primarily from seven institutional sources: the U.S. Office of Education, the Federal Interagency Committee on Education, the Bureau of the Census, the National Science Foundation, the Educational Testing Service, the American Medical Association, and the National Research Council. The data collection techniques and publication schedules for each of the primary data sources cited in this chapter are described in detail in Chapter III.

### *Enrollments and Degrees*

## Section 1:
### High school enrollments

**Figure 1.**
Number of high school graduates and number of 18-year-olds in population, 1955, 1960, 1965 and projected to 1980.



- The rates of growth of the 18-year old population and of the high school graduation population have decreased since 1965.
- High school graduation is rapidly approaching universal attainment in the United United States. Also, the percentage of boys graduating from high school, which had lagged behind that for girls, had become almost caught up by 1970. (Table 1a)
- Enrollments in most high school mathematics and science courses increased as rapidly between 1957 and 1965 as did the general enrollments. In 1965, however, although almost 75% of all 18-year olds have had at least one biology course in high school, only about 25% have had a course in chemistry and about 14% a course in physics. Likewise, only a small percentage of high school graduates have taken mathematics beyond elementary algebra and geometry. (Compare numbers of 18-year olds in Table 1a with enrollment numbers in Table 1b.)

**TABLE 1a**
**Number of High School Graduates, by Sex, with Percentages of Relevant Age Groups, 1956–67, and Projected to 1975**

| Academic Year | High School Graduates (in Thousands) | | | Relevant Age Group* (in Thousands) | | | Percentage of Relevant Age Group | | |
|---|---|---|---|---|---|---|---|---|---|
| | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total |
| 1955–56 | 682 | 739 | 1421 | 1118 | 1102 | 2220 | 61.0 | 67.1 | 64.0 |
| 1956–57 | 696 | 750 | 1446 | 1148 | 1127 | 2275 | 60.6 | 66.5 | 63.6 |
| 1957–58 | 729 | 784 | 1513 | 1180 | 1157 | 2337 | 61.8 | 67.8 | 64.7 |
| 1958–59 | 790 | 849 | 1639 | 1236 | 1212 | 2448 | 63.9 | 70.0 | 67.0 |
| 1959–60 | 898 | 966 | 1864 | 1343 | 1315 | 2658 | 66.9 | 73.5 | 70.1 |
| 1960–61 | 958 | 1013 | 1971 | 1402 | 1371 | 2773 | 68.3 | 73.9 | 71.1 |
| 1961–62 | 941 | 984 | 1925 | 1433 | 1400 | 2833 | 65.7 | 70.3 | 67.9 |
| 1962–63 | 959 | 991 | 1950 | 1406 | 1371 | 2777 | 68.2 | 72.3 | 70.2 |
| 1963–64 | 1123 | 1167 | 2290 | 1571 | 1530 | 3101 | 71.5 | 76.3 | 73.8 |
| 1964–65 | 1305 | 1337 | 2642 | 1697 | 1652 | 3349 | 77.0 | 80.9 | 78.9 |
| 1965–66 | 1326 | 1346 | 2672 | 1826 | 1776 | 3602 | 72.6 | 75.8 | 74.2 |
| 1966–67 | 1331 | 1348 | 2679 | 1798 | 1748 | 3546 | 74.0 | 77.1 | 75.5 |
| 1967–68 | 1373 | 1386 | 2759 | 1812 | 1761 | 3573 | 75.8 | 78.7 | 77.2 |
| 1968–69 | 1435 | 1446 | 2881 | 1842 | 1789 | 3631 | 78.0 | 80.8 | 79.3 |
| 1969–70 | 1503 | 1512 | 3015 | 1888 | 1835 | 3723 | 79.6 | 82.4 | 81.0 |
| 1970–71 | 1563 | 1571 | 3134 | 1942 | 1886 | 3828 | 80.4 | 83.3 | 81.8 |
| 1971–72 | 1618 | 1620 | 3238 | 1997 | 1939 | 3936 | 81.0 | 83.5 | 82.3 |
| 1972–73 | 1667 | 1664 | 3331 | 2033 | 1973 | 4006 | 82.0 | 84.3 | 83.2 |
| 1973–74 | 1716 | 1712 | 3428 | 2074 | 2013 | 4087 | 82.7 | 85.0 | 83.9 |
| 1974–75 | 1761 | 1754 | 3515 | 2101 | 2039 | 4140 | 83.8 | 86.0 | 84.9 |

*The "relevant age group" is calculated as the 3-year moving average of 18-year olds. The moving average allows for the fact that some high school graduates are age 17 and some age 19, and smooths the data somewhat as compared with the unrealistic assumption that all high school graduates are just age 18. The age group data were calculated from U.S. Census data: *"Estimates of Population of the United States by Single Years of Age, Color, and Sex 1900 to 1959"*, and *" . . . 1960–64"* and unpublished tabulations (series C) projected to 1975.

Sources:
The 1955–56 to 1965 high school graduation data were taken from OE 10036–66, *Projections of Educational Statistics to 1975–76*, 1966 Edition, U.S. Office of Education.
The 1965–66 to 1975 high school graduation data were taken from OE 10036–68, *Projections of Educational Statistics to 1977–78*, 1968 Edition, U.S. Office of Education and *Digest of Educational Statistics 1968*, (OE 10024–68).

**TABLE 1b**
**Number of enrollments in science and mathematics in public high schools, by fiscal years, 1957–1965**

| Type of Course | Number of High School Students Enrolled (in thousands) | | | | |
|---|---|---|---|---|---|
| | 1957 | 1959 | 1961 | 1963 | 1965 |
| Total All Science | 4,044 | 4,670 | 4,905 | 6,020 | 7,244 |
| General Science | 1,518 | 1,581 | 1,549 | 1,827 | 2,176 |
| Biology | 1,430 | 1,677 | 1,686 | 2,487 | 2,694 |
| Chemistry | 520 | 657 | 708 | 859 | 1,085 |
| Physics | 310 | 379 | 385 | 397 | 526 |
| Other Science | 266 | 376 | 577 | 450 | 763 |
| Total All Mathematics | 4,401 | 5,108 | 5,174 | 6,731 | 7,496 |
| General Mathematics | 976 | 1,024 | 1,377 | 1,213 | 1,387 |
| Elementary Algebra | 1,518 | 1,775 | 1,607 | 2,131 | 2,260 |
| Intermediate & Advanced Algebra | 484 | 643 | 742 | 1,017 | 1,055 |
| Geometry (Plane & Solid) | 948 | 1,085 | 1,133 | 1,527 | 1,621 |
| Trigonometry | 200 | 220 | 246 | 204 | 231 |
| Analytic Geometry & Analysis | na | na | na | na | 217 |
| Other Mathematics | 275 | 361 | 69 | 639 | 725 |

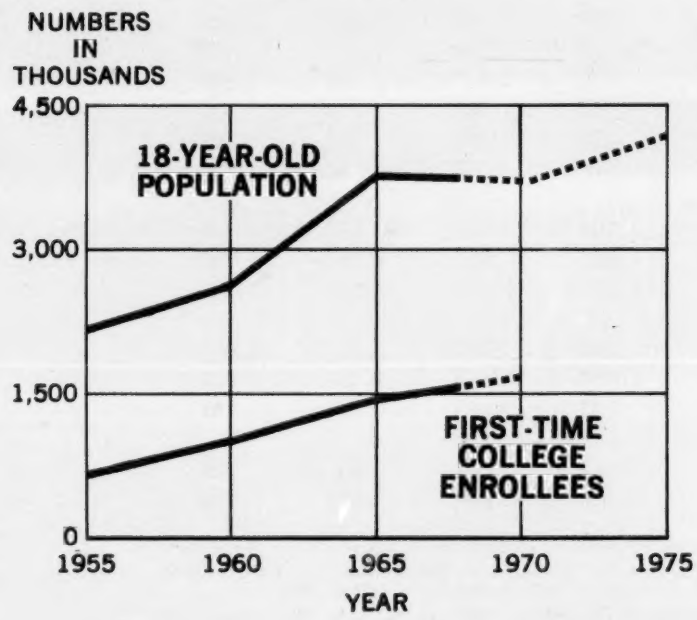
Note: The biennial survey, "Offerings and Enrollments in Science and Mathematics in Public High Schools," conducted by the U.S. Office of Education, was discontinued after 1965.

SOURCE: U.S. Office of Education, *Digest of Educational Statistics, 1968*, p. 34 U.S. Department of Commerce, *Statistical Abstract of the United States, 1966*, p. 551.

## Section 2:
### First-time college enrollments

**Figure 2.**

Number of first-time college enrollments and number of 18-year-olds in population, 1955, 1960, 1965, 1970, and projected 1975.




- The number of first-time college enrollments continues to increase, but the rate of increase has slowed since 1965.
- Almost half of the appropriate age group (18-year olds) in the United States continue with some type of formal education beyond high school.
- As of 1970, it is estimated that 61% of the male high school graduates and 49% of the female graduates continue to college.
- Women accounted for 38% of the first-time college enrollments of 1955, but they were 44% of the 1970 enrollees.

**TABLE 2**
**Number of First-Time College Enrollments with Percentage of Relevant Age Group, by Sex, 1955–1970**

| Year of Enrollment | First-Time College Enrollments (in Thousands) | | | Relevant Age Group* (in Thousands) | | | Percentage of Relevant Age Group | | |
|---|---|---|---|---|---|---|---|---|---|
| | Men | Women | Total | Men | Women | Total | Men | Women | Total |
| 1955 | 416 | 254 | 670 | 1103 | 1090 | 2193 | 37.7 | 23.3 | 30.6 |
| 1956 | 442 | 273 | 715 | 1118 | 1102 | 2220 | 39.5 | 24.8 | 32.2 |
| 1957 | 441 | 281 | 722 | 1148 | 1127 | 2275 | 38.4 | 24.9 | 31.7 |
| 1958 | 464 | 308 | 772 | 1180 | 1157 | 2337 | 39.3 | 26.6 | 33.0 |
| 1959 | 486 | 332 | 818 | 1236 | 1212 | 2448 | 39.3 | 27.4 | 33.4 |
| 1960 | 539 | 384 | 923 | 1343 | 1315 | 2658 | 40.1 | 29.2 | 34.7 |
| 1961 | 592 | 426 | 1018 | 1402 | 1371 | 2773 | 42.2 | 31.1 | 36.7 |
| 1962 | 598 | 432 | 1030 | 1433 | 1400 | 2833 | 41.7 | 30.9 | 36.4 |
| 1963 | 604 | 442 | 1046 | 1406 | 1371 | 2777 | 43.0 | 32.2 | 37.7 |
| 1964 | 702 | 523 | 1225 | 1571 | 1530 | 3101 | 44.7 | 34.2 | 39.5 |
| 1965 | 829 | 613 | 1442 | 1697 | 1652 | 3349 | 48.9 | 37.1 | 43.1 |
| 1966 | 787 | 591 | 1378 | 1826 | 1776 | 3602 | 43.1 | 33.3 | 38.3 |
| 1967 | 814 | 625 | 1439 | 1798 | 1748 | 3546 | 45.3 | 35.8 | 40.6 |
| 1968 | 925 | 705 | 1630 | 1812 | 1761 | 3573 | 51.0 | 40.0 | 45.6 |
| 1969 | (976) | (753) | (1729) | 1842 | 1789 | 3631 | 53.0 | 42.1 | 47.6 |
| 1970 | (923) | (738) | (1661) | 1888 | 1835 | 3723 | 48.9 | 40.2 | 44.6 |

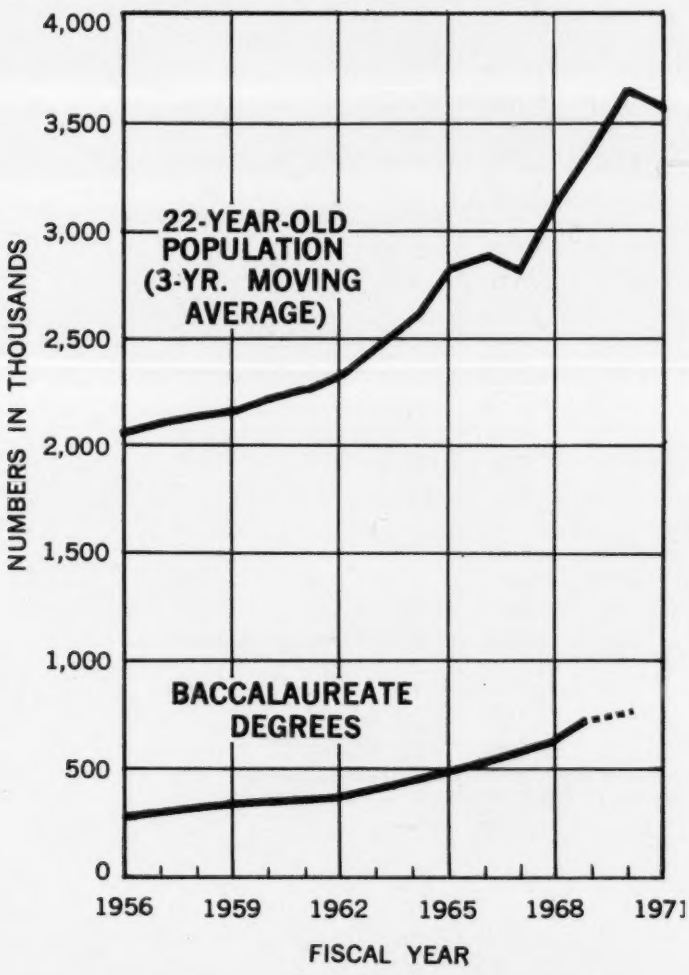
( ) = estimated
*See footnote (*) Table 1a

Sources:
Number of College Enrollment from USOE *Digest of Educational Statistics 1969*, (OE 10024–69).
Relevant Age Group data from U.S. Census; data smoothed by 3-year averaging.

## Section 3:
### Number of Baccalaureate Degrees

**Figure 3.**

Number of baccalaureate degrees granted fiscal years 1956, 1959, 1962, 1965, 1968, 1969, and 22-year-olds in population, 1956–1971 (3-year moving average).




- The relevant age group (22-year-olds) increased from 2.1 million in 1956 to 3.1 million in 1968. It will reach 4.2 million by 1980, level off for about 5 years, and then begin to decrease. Because some people earn baccalaureates at either younger or older ages, a 3-year moving average of ages 21, 22, and 23 has been used instead of the single-age figure, to smooth the statistics.
- During the period 1956–1968, in which the 22-year-old population increased 50%, the number of baccalaureated recipients increased 122%. The proportion of this age group with baccalaureates increased from 13.9% to 20.3%. The proportion of women with degrees jumped from 10.2% to 17.8%, while the proportion of men with baccalaureates increased from 17.4% to 22.8%.
- The social sciences and arts and humanities areas grew most rapidly in number of BA degrees earned—nearly 10% per year. In 1956 they accounted for 13% and 16% of the baccalaureate degrees, respectively, and in 1968 for 18% and 21%. Engineering, professional fields, and education dropped in percentage of total baccalaureates; the physical and biological sciences remained roughly constant in percentage of total baccalaureates between 1956 and 1968.
- Over the entire 1956-1968 period, in all the summary fields except the professions, the growth rate was greater for women than for men. In the 1956–59 period, the growth rate was higher for men in all fields; since 1959 the reverse has been true in all fields.
- Among the four natural science fields, the rate of increase of baccalaureate degrees between 1956 and 1968 was much greater in mathematics than in the other fields or in the total of all fields. The rate of increase in the biosciences and physics was about the same as that for all fields; the rate of growth for chemistry was appreciably slower than the others. The fastest-growing field in this group was mathematics; it is also the field with the largest proportion of women.

**TABLE 3a**
**Number of Baccalaureate Degrees Granted in Seven Summary Fields, By Sex, with Percentage of Relevant Age Group, Fiscal Years 1956–1968**

| Year | Sex | Baccalaureate Field: Physical Sciences | Engineering | Bio-Ag-Health Sciences | Social Sciences | Arts and Humanities | Professional Fields | Education | Total Baccalaureates | Relevant Age Group (in thousands) | Percentage Bacc Relevant Age Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1956 | Male | 13,293 | 26,251 | 23,439 | 24,128 | 23,789 | 49,864 | 19,883 | 180,647 | 1,041 | 17.4 |
| | Female | 3,024 | 76 | 7,105 | 11,961 | 21,506 | 12,419 | 50,733 | 106,824 | 1,046 | 10.2 |
| | Total | 16,317 | 26,327 | 30,544 | 36,089 | 45,295 | 62,283 | 70,616 | 287,471 | 2,087 | 13.8 |
| 1959 | Male | 20,167 | 38,044 | 26,328 | 31,145 | 28,562 | 63,102 | 26,448 | 233,796 | 1,077 | 21.7 |
| | Female | 4,281 | 121 | 8,461 | 13,139 | 25,376 | 11,958 | 61,429 | 124,765 | 1,091 | 11.4 |
| | Total | 24,448 | 38,165 | 34,789 | 44,284 | 53,938 | 75,060 | 87,877 | 358,561 | 2,168 | 16.5 |
| 1962 | Male | 24,051 | 32,989 | 26,119 | 34,447 | 32,719 | 57,791 | 26,077 | 234,193 | 1,168 | 20.0 |
| | Female | 6,401 | 113 | 9,875 | 15,887 | 35,352 | 11,022 | 71,159 | 149,809 | 1,167 | 12.8 |
| | Total | 30,452 | 33,102 | 35,994 | 50,334 | 68,071 | 68,813 | 97,236 | 384,002 | 2,335 | 16.4 |
| 1965 | Male | 28,445 | 34,760 | 32,566 | 48,818 | 45,416 | 70,212 | 27,900 | 299,117 | 1,413 | 21.2 |
| | Female | 8,964 | 125 | 13,952 | 25,910 | 54,079 | 14,244 | 90,634 | 207,908 | 1,395 | 14.9 |
| | Total | 37,409 | 34,885 | 46,518 | 74,728 | 99,495 | 84,456 | 118,534 | 496,025 | 2,808 | 17.7 |
| 1968 | Male | 31,546 | 37,464 | 35,046 | 70,303 | 60,044 | 92,635 | 32,709 | 359,747 | 1,581 | 22.8 |
| | Female | 11,455 | 216 | 22,908 | 42,622 | 75,911 | 20,854 | 103,150 | 277,116 | 1,554 | 17.8 |
| | Total | 43,001 | 37,680 | 57,954 | 112,925 | 135,955 | 113,489 | 135,859 | 636,863 | 3,135 | 20.3 |
| | Average Annual Growth Increments Over 1956-68 Period | | | | | | | | | | |
| | Male | 7.5 | 3.0 | 3.4 | 9.3 | 8.0 | 5.3 | 4.2 | 6.5 | | |
| | Female | 11.7 | 9.1 | 10.2 | 11.2 | 11.1 | 4.3 | 6.1 | 8.3 | | |
| | Total | 8.4 | 3.0 | 5.5 | 10.0 | 9.6 | 6.5 | 5.6 | 6.9 | | |

Note: (1) Totals in the biological-agricultural-health sciences and professional fields have been adjusted to reflect differences in categorizing "First Professional Degrees" by the U.S. Office of Education. Data for the earlier years were adjusted to conform with definitions in use since 1966.
(2) The relevant age group is defined as the 3-year moving average of 22-year olds. See text for details.

SOURCE: U.S. Office of Education, *Earned Degrees Conferred by Higher Educational Institutions.*
U.S. Department of Commerce, "Estimates of the Population of the United States, by Single Years of Age, Color, and Sex 1900 to 1959," Series P-25, No. 311, July 2, 1965, p. 10, p. 4; "Estimates of the Population of the United States, by Single Years of Age, Color, and Sex 1960 to 1964," Series P-25, No. 314, August 19, 1965, p. 7; "Estimates of the Population of the United States, by Age, Race, and Sex: July 1, 1964 to 1967," Series P-25, No. 385, February 14, 1968, p. 15.

**TABLE 3b**
**Number of Baccalaureate Degrees Granted in Four Selected Natural Science Fields, by Sex, Fiscal Years 1956–1968.**

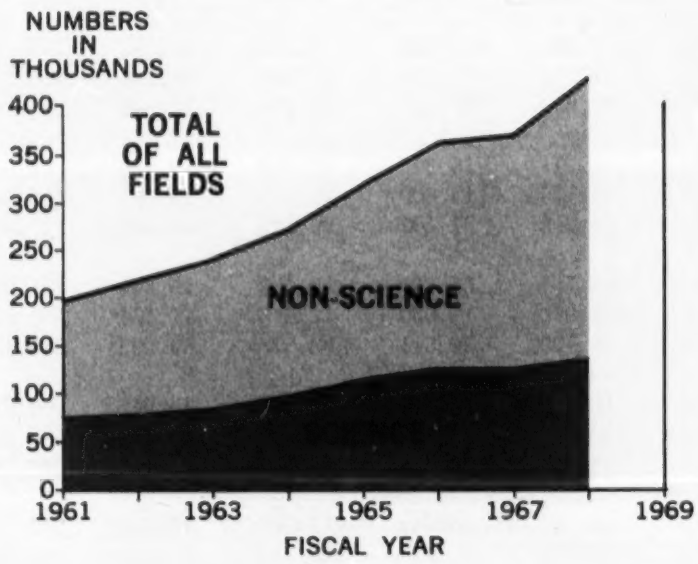
| Fiscal Year | Sex | Mathematics* | Physics | Chemistry | Bio-sciences** |
|---|---|---|---|---|---|
| 1956 | Male | 3,137 | 2,233 | 4,996 | 9,607 |
| | Female | 1,523 | 102 | 1,182 | 2,959 |
| | Total | 4,660 | 2,335 | 6,178 | 12,566 |
| | % Female | 32.7 | 4.4 | 19.1 | 23.5 |
| 1959 | Male | 6,504 (28) | 3,668 (18) | 5,897 (6) | 11,503 (6) |
| | Female | 2,515 (18) | 141 (11) | 1,411 (6) | 3,646 (7) |
| | Total | 9,019 (25) | 3,809 (18) | 7,308 (6) | 15,149 (6) |
| | % Female | 27.9 | 3.7 | 19.3 | 24.1 |
| 1962 | Male | 10,354 (17) | 4,624 (8) | 6,369 (2.5) | 12,155 (2) |
| | Female | 4,255 (19) | 188 (10) | 1,715 (7) | 4,822 (10) |
| | Total | 14,609 (18) | 4,812 (8) | 8,084 (3) | 16,977 (4) |
| | % Female | 29.1 | 3.9 | 21.2 | 28.4 |
| 1965 | Male | 13,177 (8) | 4,679 (<1) | 8,106 (8) | 17,844 (14) |
| | Female | 6,440 (15) | 245 (9) | 1,931 (4) | 7,380 (15) |
| | Total | 19,617 (10) | 4,924 (1) | 10,037 (7) | 25,224 (14) |
| | % Female | 32.8 | 5.0 | 19.2 | 29.3 |
| 1968 | Male | 14,839 (4) | 4,749 (<1) | 8,876 (3) | 23,107 (9) |
| | Female | 8,786 (11) | 296 (6) | 1,962 (<1) | 8,948 (7) |
| | Total | 23,625 (6) | 5,045 (1) | 10,838 (2) | 32,055 (8) |
| | % Female | 37.2 | 5.9 | 18.1 | 27.9 |

*Includes statistics.
**Excludes agriculture, forestry, and health sciences which are included in "Bio-Agricultural Health Sciences" in Table 3a.
Note: Figures in parentheses indicate average *annual* percentage increment over the 3-year period shown.
SOURCE: U.S. Office of Education, *Earned Degrees Conferred by Higher Educational Institutions.*

## Section 4:
### First-year graduate enrollments

**Figure 4.**

Number of first-year graduate enrollments, science versus all fields, FY 1961–1968.




- The total number of first-year graduate enrollments in FY 1968 was more than double that of FY 1961. (Students who had completed less than one full year of required work for an advanced degree or its equivalent in part-time work are designated as "first-year students".) Full-time enrollments increased most rapidly, representing 33.9% of the 1961–63 total enrollment, and 38.5% of the 1966–68 enrollments. (A full-time student is one whose academic load in terms of course work or other activity (such as thesis) is at least 75% of that normally expected of such students; all others are part-time students.)
- The percentage increases in enrollments, FY 1961 to FY 1968, in the sciences and engineering were less than in the nonscience fields, corresponding with a smaller rate of increase in baccalaureate degrees (see Section 3).
- Full-time first-year graduate enrollments varied from a low of 14% in education (1961–63) to 68.4% in biosciences (1966–68). From the 1961–63 period to 1966–68, the percentage of full-time first year enrollments increased in all fields, social sciences showing the greatest increase, from 51.1% to 58.6%.
- The distribution of first-year graduate enrollments among the seven summary fields is roughly proportional to the distribution of baccalaureates in these fields. The sciences and engineering account for about 40% of the baccalaureates, and they account for 45% of the full-time graduate enrollments and 32% of the total first-year enrollments.
- Among the four natural science fields, the rate of increase in total first-year graduate enrollments (1961 to 1968) for the biosciences was slightly higher than that for all fields; the rate of increase for mathematics was somewhat lower than that for all fields; and the increments for physics and chemistry markedly lower.
- In math and physics, the growth rate in baccalaureates for women lags behind that for men by at least 3 years, while in biosciences and chemistry the growth rate changes are mixed.
- In the four natural science fields, the ratio of first-year graduate enrollments to baccalaureates granted the preceding June varied widely. In math it varied between 50% and 60%; in chemistry it went up to nearly 70%; in biosciences it was slightly below 50%, while in physics it was over 100%. In evaluating these statistics, it is important to keep in mind the fact that "first-year" does *not* mean "first time in graduate school". A student attending on a part-time basis may be enrolled for several years before completing the equivalent of a full year of graduate work.

**TABLE 4a.**
**Number of First-Year Graduate Enrollments in 7 Summary Fields, By Attendance Status FY 1961–1968**

| Fiscal Year | Status | Physical Sciences | Engineering | Biological Sciences | Social Sciences | Arts and Humanities | Professional Fields | Education | Total All Fields |
|---|---|---|---|---|---|---|---|---|---|
| 1961 | Full-time | 9,408 | 7,996 | 8,549 | 11,592 | 12,038 | 8,560 | 10,782 | 68,925 |
| | Part-time | 10,238 | 11,898 | 4,152 | 11,261 | 11,914 | 18,564 | 60,228 | 128,255 |
| | Total | 19,646 | 19,894 | 12,701 | 22,853 | 23,952 | 27,124 | 71,010 | 197,180 |
| 1962 | Full-time | 9,762 | 8,245 | 8,744 | 12,741 | 13,293 | 8,964 | 10,896 | 72,645 |
| | Part-time | 10,334 | 13,306 | 4,567 | 12,175 | 13,809 | 20,585 | 70,071 | 144,847 |
| | Total | 20,096 | 21,551 | 13,311 | 24,916 | 27,102 | 29,549 | 80,967 | 217,492 |
| 1963 | Full-time | 10,782 | 9,092 | 9,537 | 13,751 | 14,461 | 10,263 | 12,331 | 80,217 |
| | Part-time | 11,260 | 14,957 | 4,729 | 12,976 | 16,050 | 22,815 | 77,464 | 160,251 |
| | Total | 22,042 | 24,049 | 14,266 | 26,727 | 30,511 | 33,078 | 89,795 | 240,468 |
| 1964 | Full-time | 11,817 | 10,021 | 10,624 | 16,096 | 17,360 | 10,755 | 13,945 | 90,618 |
| | Part-time | 12,961 | 17,390 | 5,469 | 14,987 | 19,173 | 26,447 | 83,794 | 180,221 |
| | Total | 24,778 | 27,411 | 16,093 | 31,083 | 36,533 | 37,202 | 97,739 | 270,839 |
| 1965 | Full-time | 14,141 | 11,433 | 12,819 | 20,564 | 20,742 | 17,076 | 17,009 | 113,784 |
| | Part-time | 14,236 | 18,812 | 6,466 | 16,817 | 22,718 | 35,747 | 89,228 | 204,024 |
| | Total | 28,377 | 30,245 | 19,285 | 37,381 | 43,460 | 52,823 | 106,237 | 317,808 |
| 1966 | Full-time | 15,183 | 12,391 | 14,762 | 23,488 | 25,224 | 20,902 | 19,864 | 131,814 |
| | Part-time | 15,099 | 20,121 | 7,415 | 18,507 | 25,519 | 29,548 | 100,827 | 227,036 |
| | Total | 30,282 | 32,512 | 22,177 | 41,995 | 50,743 | 60,450 | 120,691 | 358,850 |
| 1967 | Full-time | 16,768 | 12,890 | 16,153 | 25,099 | 28,137 | 25,734 | 23,982 | 148,763 |
| | Part-time | 13,852 | 19,388 | 6,961 | 16,469 | 24,906 | 38,816 | 101,617 | 222,009 |
| | Total | 30,620 | 32,278 | 23,114 | 41,568 | 53,043 | 64,550 | 125,59[illegible] | 370,772 |
| 1968 | Full-time | 17,121 | 13,570 | 16,366 | 28,427 | 32,156 | 29,926 | 28,213 | 165,782 |
| | Part-time | 15,237 | 20,164 | 7,437 | 19,321 | 28,074 | 48,386 | 123,625 | 262,244 |
| | Total | 32,358 | 33,734 | 23,803 | 47,748 | 60,230 | 78,312 | 151,841 | 428,026 |
| | Percent Full-Time Enrollments | | | | | | | | |
| 1961-1963 | | 48.4 | 38.8 | 66.6 | 51.1 | 48.9 | 31.0 | 14.1 | 33.9 |
| 1964,1965 | | 48.7 | 37.2 | 66.3 | 53.4 | 47.6 | 30.6 | 15.2 | 34.7 |
| 1966-1968 | | 52.6 | 39.4 | 68.4 | 58.6 | 52.0 | 37.6 | 18.0 | 38.5 |

**Note:** Students who had completed less than one full year of required work for an advanced degree or its equivalent in part-time work are designated as "first-year students".
A full-time student is one whose academic load in terms of course work or other activity (such as thesis) is at least 75% of that normally expected of such students; a part-time student is one whose academic load is less than 75%.

**SOURCE:** U.S. Office of Education, *Students Enrolled for Advanced Degrees*, 54019 series.

**TABLE 4b.**
**Number of first-year graduate enrollments in 4 natural science fields, by attendance status, fiscal years 1961–1968**

| Fiscal Year | Status | Mathematics | Physics | Chemistry | Bio-sciences |
|---|---|---|---|---|---|
| 1961 | Full-time | 2,989 | 2,209 | 2,656 | 4,340 |
| | Part-time | 4,466 | 2,233 | 2,526 | 2,697 |
| | Total | 7,455 | 4,442 | 5,182 | 7,037 |
| 1962 | Full-time | 3,234 | 2,400 | 2,697 | 4,634 |
| | Part-time | 4,617 | 2,176 | 2,628 | 3,065 |
| | Total | 7,851 | 4,576 | 5,325 | 7,699 |
| 1963 | Full-time | 3,494 | 2,528 | 3,172 | 5,084 |
| | Part-time | 5,319 | 2,329 | 2,717 | 3,112 |
| | Total | 8,813 | 4,857 | 5,889 | 8,196 |
| 1964 | Full-time | 3,952 | 2,694 | 3,418 | 5,973 |
| | Part-time | 6,151 | 2,609 | 3,233 | 3,772 |
| | Total | 10,103 | 5,303 | 6,651 | 9,745 |
| 1965 | Full-time | 4,870 | 3,154 | 3,791 | 7,361 |
| | Part-time | 6,960 | 2,773 | 3,162 | 4,460 |
| | Total | 11,830 | 5,927 | 6,953 | 11,821 |
| 1966 | Full-time | 5,343 | 3,263 | 4,038 | 8,486 |
| | Part-time | 7,616 | 2,581 | 3,369 | 5,122 |
| | Total | 12,959 | 5,844 | 7,407 | 13,608 |
| 1967 | Full-time | 5,698 | 3,231 | 4,665 | 9,310 |
| | Part-time | 6,926 | 2,037 | 2,679 | 4,890 |
| | Total | 12,624 | 5,268 | 7,344 | 14,200 |
| 1968 | Full-time | 5,577 | 3,373 | 4,608 | 9,528 |
| | Part-time | 7,576 | 2,187 | 2,732 | 5,346 |
| | Total | 13,153 | 5,560 | 7,340 | 14,874 |

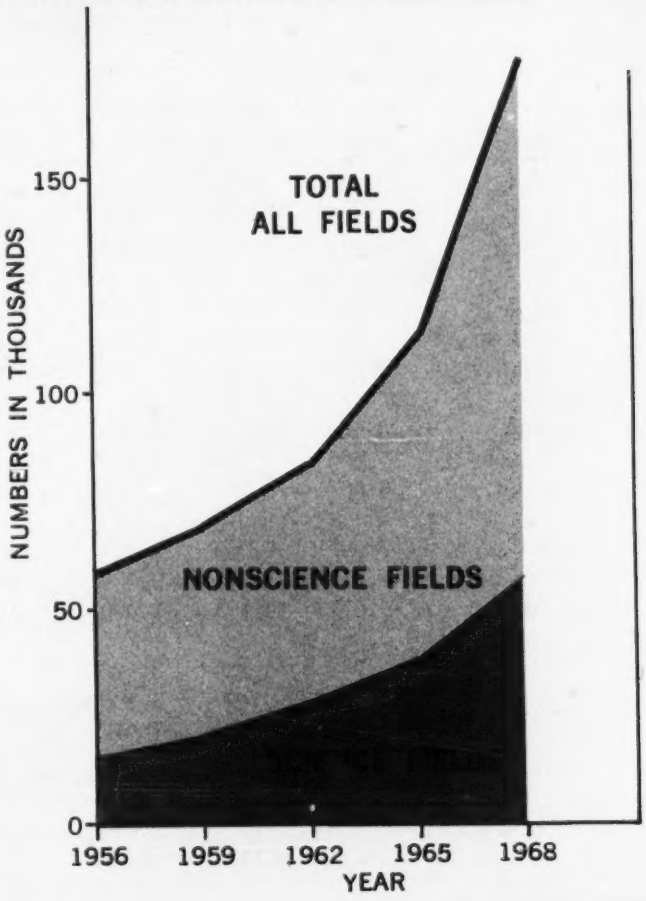
Note: For definitions of "first-year enrollments," "full-time," and "part-time" see Table 4a.

SOURCE: U.S. Office of Education, *Students Enrolled for Advanced Degrees*, 54019 series.

## Section 5:
### Number of Master's degrees

- The number of master's degrees granted/year tripled between FY 1956 and FY 1968.
- Master's degree production is increasing much faster than the rate of growth of the 24-year old age group. The percentage of the age group attaining the master's degree increased from 3% to 6% between FY 1956 and FY 1968.

**Figure 5.**
Number of master's degrees granted, science versus all fields, FY 1956–1968.




- Men received two-thirds of the master's degrees awarded during the period 1956–1968. Only in education and arts and humanities did women receive as many master's degrees as men.
- The sciences and engineering, which account for 32% of the total first-year graduate enrollments, also account for 32% of the master's degrees.
- Within the four natural science fields, the rate of increase of master's degree production (1956-1968) for the biosciences and physics was about the same as that for all fields combined; the rate of increase for mathematics was almost double that for all fields; and the rate of increase for chemistry was much less than that for all fields.

**TABLE 5a.**
**Number of Master's Degrees Granted in 7 Summary Fields, By Sex, with Percentage of 24-Year Olds, Fiscal Years 1956–1968**

| Fiscal Year | Sex | Master's Field: Physical Sciences | Engineering | Biological Sciences | Social Sciences | Arts and Humanities | Professional Fields | Education | Total Master's | Total 24-year olds (in thousands) | Percentage Master's /24-year olds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1956 | Male | 3,143 | 4,716 | 3,249 | 3,454 | 4,045 | 4,801 | 16,005 | 39,413 | 1,091 | 3.6 |
| | Female | 399 | 19 | 819 | 974 | 2,608 | 1,075 | 14,133 | 20,027 | 1,096 | 1.8 |
| | Total | 3,542 | 4,735 | 4,068 | 4,428 | 6,653 | 5,876 | 30,138 | 59,440 | 2,187 | 2.7 |
| 1959 | Male | 4,059 | 6,767 | 3,727 | 4,138 | 5,034 | 6,642 | 16,954 | 47,321 | 1,092 | 4.3 |
| | Female | 581 | 24 | 1,240 | 1,144 | 3,299 | 1,273 | 14,615 | 22,176 | 1,091 | 2.0 |
| | Total | 4,640 | 6,791 | 4,967 | 5,282 | 8,333 | 7,915 | 31,569 | 69,497 | 2,182 | 3.2 |
| 1962 | Male | 5,681 | 8,911 | 4,285 | 5,596 | 6,277 | 8,110 | 19,845 | 58,705 | 1,125 | 5.2 |
| | Female | 886 | 40 | 1,365 | 1,634 | 4,594 | 1,537 | 16,128 | 26,184 | 1,134 | 2.3 |
| | Total | 6,567 | 8,951 | 5,650 | 7,230 | 10,871 | 9,647 | 35,973 | 84,889 | 2,259 | 3.8 |
| 1965 | Male | 7,699 | 12,060 | 5,377 | 7,803 | 10,020 | 10,244 | 23,008 | 76,211 | 1,226 | 6.2 |
| | Female | 1,318 | 45 | 2,123 | 2,293 | 7,430 | 1,958 | 20,817 | 35,984 | 1,221 | 3.0 |
| | Total | 9,017 | 12,105 | 7,500 | 10,096 | 17,450 | 12,202 | 43,825 | 112,195 | 2,447 | 5 0 |
| 1968 | Male | 9,031 | 15,133 | 7,576 | 13,738 | 13,393 | 23,911 | 30,967 | 113,749 | 1,421 | 8 0 |
| | Female | 1,966 | 99 | 3,466 | 6,375 | 11,751 | 6,889 | 32,855 | 63,401 | 1,408 | 4.5 |
| | Total | 10,997 | 15,232 | 11,042 | 20,113 | 25,144 | 30,800 | 63,822 | 177,150 | 2,829 | 6.3 |
| | Average Annual Percentage Growth Increments, 1956-1968 | | | | | | | | | | |
| | Male | 9.3 | 10.1 | 7.3 | 12.2 | 10.6 | x | 5.7 | 9.2 | | |
| | Female | 14.2 | 14.7 | 12.8 | 16.9 | 13.3 | x | 7.3 | 10.1 | | |
| | Total | 9.9 | 10.1 | 8.7 | 13.4 | 11.7 | x | 6.4 | 9.5 | | |

Note: Re-definition in 1966 of master's degrees to include those previously termed "first professional" in some subfields renders this series non-comparable between 1965 and 1968.

SOURCE: U.S. Office of Education, *Earned Degrees Conferred by Higher Educational Institutions.*
U.S. Department of Commerce, "Estimates of the Population of the United States by Single Years of Age, Color, and Sex 1900 to 1959," Series P–25, No. 311, July 2, 1965, p. 10, p. 4; "Estimates of the Population of the United States, by Single Years of age, Color, and Sex 1960 to 1964," Series P–25, No.314, August 19, 1965, p. 7; "Estimates of the Population of the United States, by Age, Race, and Sex: July 1, 1964 to 1967," Series P–25, No. 385, February 14, 1968, p. 15.

**TABLE 5b.**
**Number of Master's Degrees Granted in 4 Natural Science Fields, By Sex, Fiscal Years 1956–1968**

| Fiscal Year | Sex | Mathematics* | Physics | Chemistry | Biosciences |
|---|---|---|---|---|---|
| 1956 | Male | 719 | 719 | 1,035 | 1,379 |
| | Female | 179 | 23 | 129 | 380 |
| | Total | 898 | 742 | 1,164 | 1,759 |
| 1959 | Male | 1,188 | 885 | 981 | 1,543 |
| | Female | 311 | 30 | 164 | 459 |
| | Total | 1,499 | 915 | 1,145 | 2,002 |
| 1962 | Male | 2,179 | 1,363 | 1,163 | 1,982 |
| | Female | 501 | 62 | 241 | 660 |
| | Total | 2,680 | 1,425 | 1,404 | 2,642 |
| 1965 | Male | 3,531 | 1,826 | 1,362 | 2,629 |
| | Female | 812 | 80 | 322 | 975 |
| | Total | 4,343 | 1,906 | 1,684 | 3,604 |
| 1968 | Male | 4,202 | 1,993 | 1,579 | 3,963 |
| | Female | 1,331 | 95 | 407 | 1,554 |
| | Total | 5,533 | 2,088 | 1,986 | 5,517 |
| Average Annual Percentage Growth Increments 1956-1968 | | | | | |
| | Male | 15.9 | 8.9 | 3.6 | 9.2 |
| | Female | 18.2 | 12.5 | 10.1 | 12.5 |
| | Total | 16.3 | 9.0 | 4.5 | 10.0 |

*Includes statistics.
SOURCE: U.S. Office of Education, *Earned Degrees Conferred by Higher Educational Institutions.*

## Section 6:
## Numbers of research doctorates

- The number of research doctorates granted in FY 1970 was three times as great as the number granted in FY 1960.
- Despite the rapid increase in PhD production, only a very small percentage of the age group attains the doctorate. The ratio of FY 1969 doctorate recipients who were U.S. citizens to U.S. 30-year-old population was 0.009, less than 1%.
- Approximately one-eighth of all research doctorate recipients are women.
- Almost two-thirds of the doctorates are awarded in the science and engineering fields. These fields account for only one-third of the first-year graduate enrollments and one-third of the master's degrees.
- The distribution of doctorates by summary field has remained relatively stable throughout the period, except for engineering, which accounted for only 8.1% of the FY 1960 doctorates but 11.7% of the FY 1970 total.

**Figure 6.**
Number of research doctorates granted, science versus all fields, FY 1960–1970.

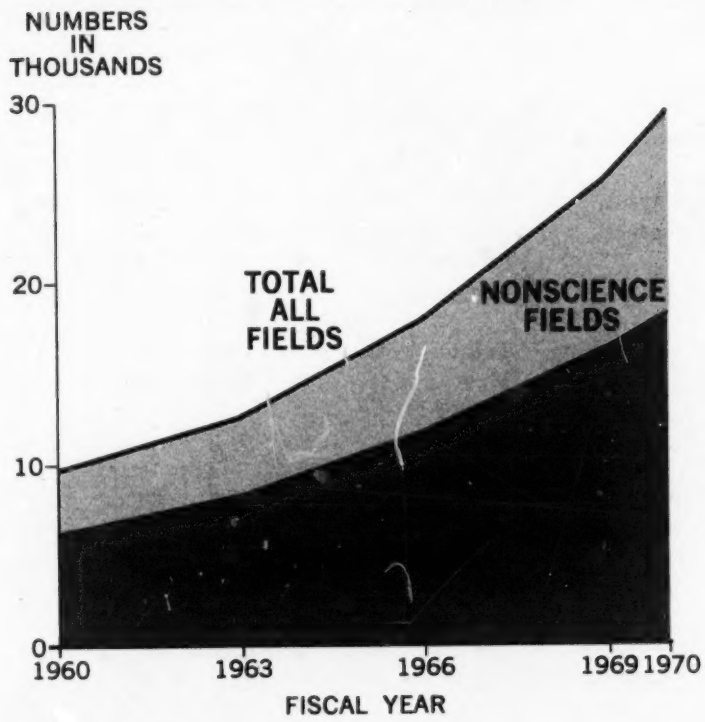


**TABLE 6a**
**Number of Research Doctorate Degrees Granted in 7 Summary Fields, By Sex, Fiscal Years 1960–1970**

| Field | Sex | Fiscal Year of Doctorate | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
| Physical Sciences | Total | 2125 | 2325 | 2484 | 2911 | 3116 | 3550 | 3828 | 4331 | 4637 | 4964 | 5607 |
| | Male | 2077 | 2243 | 2383 | 2787 | 2980 | 3373 | 3648 | 4123 | 4405 | 4705 | 5289 |
| | Female | 75 | 82 | 101 | 124 | 136 | 177 | 180 | 208 | 232 | 259 | 318 |
| | % Female | 3.5 | 3.5 | 3.1 | 4.3 | 4.4 | 5.0 | 4.7 | 4.8 | 5.0 | 5.2 | 5.7 |
| Engineering | Total | 794 | 940 | 1215 | 1356 | 1663 | 2073 | 2299 | 2602 | 2850 | 3234 | 3432 |
| | Male | 791 | 936 | 1211 | 1346 | 1653 | 2066 | 2291 | 2593 | 2838 | 3224 | 3417 |
| | Female | 3 | 4 | 4 | 10 | 10 | 7 | 8 | 9 | 12 | 10 | 15 |
| | % Female | 0.4 | 0.4 | 0.3 | 0.7 | 0.6 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 |
| Bio-Ag-Hlth Sciences | Total | 1728 | 1783 | 1976 | 2081 | 2362 | 2685 | 2885 | 3143 | 3693 | 4116 | 4564 |
| | Male | 1575 | 1618 | 1784 | 1875 | 2118 | 2407 | 2540 | 2725 | 3184 | 3547 | 3977 |
| | Female | 153 | 165 | 192 | 206 | 244 | 278 | 345 | 418 | 509 | 569 | 587 |
| | % Female | 8.9 | 9.3 | 9.7 | 9.9 | 10.3 | 10.4 | 12.0 | 13.3 | 13.8 | 13.8 | 12.9 |
| Social Sciences | Total | 1696 | 1821 | 1928 | 2078 | 2304 | 2376 | 2691 | 3178 | 3583 | 4024 | 4647 |
| | Male | 1471 | 1562 | 1674 | 1795 | 1973 | 2062 | 2283 | 2705 | 3008 | 3339 | 3862 |
| | Female | 225 | 259 | 254 | 283 | 331 | 314 | 408 | 473 | 575 | 685 | 785 |
| | % Female | 13.3 | 14.2 | 13.2 | 13.6 | 14.4 | 13.2 | 15.2 | 14.9 | 16.0 | 17.0 | 16.9 |
| Arts and Humanities | Total | 1448 | 1495 | 1561 | 1662 | 1982 | 2327 | 2508 | 2863 | 3196 | 3544 | 4043 |
| | Male | 1197 | 1262 | 1280 | 1375 | 1644 | 1925 | 2011 | 2306 | 2482 | 2710 | 3094 |
| | Female | 251 | 233 | 281 | 287 | 338 | 402 | 497 | 557 | 714 | 834 | 949 |
| | % Female | 17.3 | 15.6 | 18.0 | 17.3 | 17.1 | 17.3 | 19.8 | 19.5 | 22.3 | 23.5 | 23.5 |
| Professional Fields | Total | 362 | 365 | 438 | 492 | 527 | 590 | 676 | 759 | 857 | 901 | 1111 |
| | Male | 326 | 325 | 393 | 428 | 477 | 536 | 604 | 679 | 774 | 809 | 993 |
| | Female | 36 | 40 | 45 | 64 | 50 | 54 | 72 | 80 | 83 | 92 | 118 |
| | % Female | 9.9 | 11.0 | 10.3 | 13.0 | 9.5 | 9.2 | 10.7 | 10.5 | 9.7 | 10.2 | 10.6 |
| Education | Total | 1548 | 1680 | 1898 | 2131 | 2350 | 2736 | 3043 | 3477 | 4022 | 4618 | 5836 |
| | Male | 1250 | 1335 | 1539 | 1715 | 1900 | 2209 | 2462 | 2789 | 3223 | 3720 | 4654 |
| | Female | 298 | 345 | 359 | 416 | 450 | 527 | 581 | 688 | 799 | 898 | 1182 |
| | % Female | 19.3 | 20.5 | 18.9 | 19.5 | 19.1 | 19.3 | 19.1 | 19.8 | 19.9 | 19.4 | 20.2 |
| Other and Unspecified | Total | 6 | 4 | 6 | 12 | 19 | 5 | 24 | 33 | 85 | 333 | 196 |
| | Male | 5 | 4 | 6 | 11 | 17 | 5 | 24 | 26 | 80 | 286 | 189 |
| | Female | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 7 | 5 | 47 | 7 |
| | % Female | 16.7 | 0 | 0 | 8.3 | 10.5 | 0 | 0 | 21.2 | 5.9 | 14.1 | 3.6 |
| Total PhD's | Total | 9,734 | 10,413 | 11,506 | 12,723 | 14,323 | 16,342 | 17,954 | 20,386 | 22,923 | 25,734 | 29,436 |
| | Male | 8,692 | 9,285 | 10,270 | 11,332 | 12,762 | 14,583 | 15,863 | 17,946 | 19,994 | 22,340 | 25,475 |
| | Female | 1042 | 1128 | 1236 | 1391 | 1561 | 1759 | 2091 | 2440 | 2929 | 3394 | 3,961 |
| | % Female | 10.7 | 10.8 | 10.7 | 10.9 | 10.9 | 10.8 | 11.6 | 12.0 | 12.8 | 13.2 | 13.4 |

**SOURCE:** National Research Council, Office of Scientific Personnel, Doctorate Records File

**TABLE 6b**
**Number of Research Doctorates Granted in All Fields Combined, 1960–1970, With 30-year-old Population and Percentage of Age Group Attaining Doctorates**

| Fiscal Year | Doctorates Granted | | | Population, Age 30* (in thousands) | | | Percent of Age Group Earning Doctorates | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 1960 | 8,692 | 1,042 | 9,734 | 1,135 | 1,164 | 2,299 | .76 | .09 | .42 |
| 1961 | 9,285 | 1,128 | 10,413 | 1,122 | 1,150 | 2,272 | .83 | .10 | .46 |
| 1962 | 10,270 | 1,236 | 11,506 | 1,102 | 1,127 | 2,229 | .93 | .11 | .52 |
| 1963 | 11,332 | 1,391 | 12,723 | 1,080 | 1,101 | 2,181 | 1.05 | .13 | .58 |
| 1964 | 12,762 | 1,561 | 14,323 | 1,075 | 1,094 | 2,169 | 1.19 | .14 | .66 |
| 1965 | 14,583 | 1,759 | 16,342 | 1,080 | 1,096 | 2,176 | 1.35 | .16 | .75 |
| 1966 | 15,863 | 2,091 | 17,954 | 1,098 | 1,110 | 2,208 | 1.44 | .19 | .81 |
| 1967 | 17,946 | 2,240 | 20,386 | 1,114 | 1,131 | 2,245 | 1.61 | .20 | .91 |
| 1968 | 19,994 | 2,929 | 22,923 | 1,137 | 1,155 | 2,292 | 1.76 | .25 | 1.00 |
| 1969 | 22,340 | 3,394 | 25,734 | 1,158 | 1,177 | 2,335 | 1.93 | .29 | 1.10 |
| 1970 | 25,475 | 3,961 | 29,436 | 1,188 | 1,207 | 2,395 | 2.14 | .33 | 1.23 |

*3-year moving average, to smooth data and in recognition of the fact that some are younger, some older, at attainment of doctorate. Computed from estimates from U.S. Census Estimates—Series P–25, No. 385.

SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File

**TABLE 6c**
**Number of Research Doctorates Granted in 4 Selected Natural Science Fields FY 1960–1970**

| Field | Sex | Fiscal Year of Doctorate | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
| Mathematics | Total | 291 | 332 | 388 | 484 | 589 | 685 | 769 | 830 | 972 | 1063 | 1218 |
| | Male | 276 | 315 | 366 | 456 | 556 | 635 | 721 | 782 | 923 | 1007 | 1142 |
| | Female | 15 | 17 | 22 | 28 | 33 | 50 | 48 | 48 | 49 | 56 | 76 |
| | % Female | 5.2 | 5.1 | 5.7 | 5.8 | 5.6 | 7.3 | 6.2 | 5.8 | 5.0 | 5.3 | 6.2 |
| Physics | Total | 530 | 597 | 710 | 817 | 866 | 1046 | 1061 | 1310 | 1430 | 1452 | 1657 |
| | Male | 521 | 590 | 696 | 807 | 852 | 1019 | 1039 | 1274 | 1397 | 1414 | 1611 |
| | Female | 9 | 7 | 14 | 10 | 14 | 27 | 22 | 36 | 33 | 38 | 46 |
| | % Female | 1.7 | 1.2 | 2.0 | 1.2 | 1.6 | 2.6 | 2.1 | 2.7 | 2.3 | 2.6 | 2.7 |
| Chemistry | Total | 1078 | 1150 | 1137 | 1288 | 1350 | 1444 | 1594 | 1773 | 1793 | 1947 | 2223 |
| | Male | 1030 | 1094 | 1077 | 1206 | 1266 | 1345 | 1496 | 1655 | 1654 | 1801 | 2043 |
| | Female | 48 | 56 | 60 | 82 | 84 | 99 | 98 | 118 | 139 | 146 | 180 |
| | % Female | 4.5 | 4.9 | 5.3 | 6.4 | 6.2 | 6.9 | 6.1 | 6.7 | 7.8 | 7.5 | 8.1 |
| Biosciences | Total | [illegible] | [illegible]2 | 1299 | 1414 | 1582 | 1829 | 1991 | 2197 | 2616 | 2865 | 3162 |
| | Male | 1023 | 1018 | 1125 | 1231 | 1371 | 1586 | 1685 | 1822 | 2169 | 2367 | 2665 |
| | Female | 135 | 154 | 174 | 183 | 211 | 243 | 306 | 375 | 447 | 498 | 497 |
| | % Female | 11.7 | 13.1 | 13.4 | 12.9 | 13.3 | 13.3 | 15.4 | 17.1 | 17.1 | 17.4 | 15.7 |

**SOURCE:** National Research Council, Office of Scientific Personnel, Doctorate Records File

**TABLE 6d.**
**Number of research doctorate degrees granted in 7 selected bioscience fields, NIGMS-Supported*vs. non-NIGMS-Supported, FY 1958–1969**

| Fiscal Year of PhD | Support Status in Grad. School | Anatomy | Bio-chemistry | Bio-physics | Genetics | Micro-biology | Pharma-ology | Physi-ology | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1958 | NIGMS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Non-NIGMS | 30 | 237 | 21 | 71 | 203 | 48 | 0 | 610 |
| 1959 | NIGMS | 0 | 8 | 0 | 1 | 1 | 1 | 4 | 15 |
| | Non-NIGMS | 36 | 209 | 23 | 74 | 167 | 39 | 0 | 548 |
| 1960 | NIGMS | 2 | 13 | 0 | 5 | 4 | 4 | 3 | 31 |
| | Non-NIGMS | 29 | 245 | 23 | 68 | 180 | 49 | 2 | 596 |
| 1961 | NIGMS | 5 | 53 | 1 | 9 | 15 | 18 | 18 | 119 |
| | Non-NIGMS | 40 | 221 | 24 | 64 | 161 | 31 | 2 | 543 |
| 1962 | NIGMS | 17 | 81 | 10 | 17 | 45 | 20 | 27 | 217 |
| | Non-NIGMS | 32 | 205 | 23 | 64 | 154 | 54 | 61 | 593 |
| 1963 | NIGMS | 17 | 128 | 9 | 27 | 52 | 25 | 45 | 303 |
| | Non-NIGMS | 34 | 175 | 27 | 70 | 158 | 46 | 97 | 607 |
| 1964 | NIGMS | 31 | 164 | 21 | 26 | 52 | 44 | 64 | 402 |
| | Non-NIGMS | 25 | 206 | 19 | 72 | 142 | 46 | 125 | 635 |
| 1965 | NIGMS | 49 | 185 | 34 | 33 | 95 | 55 | 107 | 558 |
| | Non-NIGMS | 39 | 208 | 20 | 69 | 179 | 44 | 97 | 656 |
| 1966 | NIGMS | 29 | 243 | 39 | 36 | 112 | 62 | 93 | 614 |
| | Non-NIGMS | 37 | 215 | 42 | 77 | 176 | 44 | 103 | 694 |
| 1967 | NIGMS | 45 | 247 | 54 | 49 | 111 | 72 | 115 | 693 |
| | Non-NIGMS | 40 | 254 | 38 | 95 | 222 | 43 | 132 | 824 |
| 1968 | NIGMS | 53 | 306 | 65 | 51 | 139 | 80 | 146 | 840 |
| | Non-NIGMS | 34 | 271 | 40 | 101 | 220 | 67 | 156 | 889 |
| 1969 | NIGMS | 61 | 260 | 75 | 54 | 152 | 86 | 163 | 851 |
| | Non-NIGMS | 60 | 287 | 35 | 72 | 228 | 61 | 156 | 899 |
| Total, All Years | NIGMS | 309 | 1,688 | 308 | 308 | 778 | 467 | 785 | 4,643 |
| | Non-NIGMS | 436 | 2,733 | 335 | 897 | 2,190 | 572 | 931 | 8,094 |

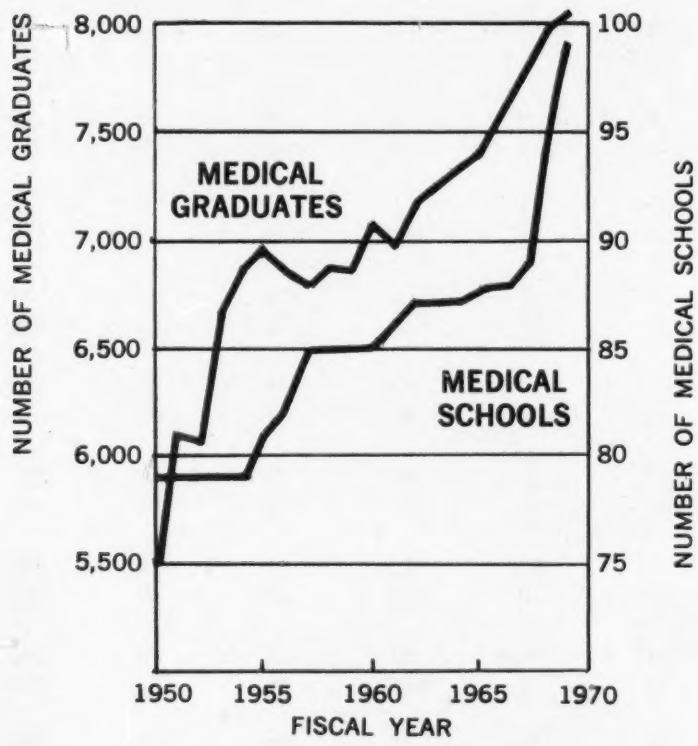
*Persons receiving any support by fellowship or traineeship are included here as NIGMS-supported.

Notes: All NIGMS-supported doctorate recipients in physiology were assumed to be in the area of animal physiology.
Two of the seven bioscience fields show a decrease in total PhD production between FY 1968 and FY 1969. However, a new field (molecular biology) was introduced into the Survey of Earned Doctorates Specialties List in FY 1969, and 89 persons selected it. Because most of these 89 would have selected one of the seven listed fields of molecular biology had not been available, the apparent decreases in PhD production should be interpreted with caution.

SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.
NIGMS, Statement of Appointment of Trainee and Fellowship Award Statement.

## Medical Enrollments

**Figure 6a.**
Number of U.S. medical schools and M.D. graduates, FY 1950–1969.




- Following the post-WWII spurt, there was a slight drop in output of physicians to 1957, then very slow growth until 1965. Since that time, growth in output has averaged slightly over 2% per annum—approximately the growth rate of the U.S. population.
- Number of medical schools in operation was practically constant through the 1950's. Schools in development in the late 1950's came into operation in the 1960's; a dozen new schools were in development between 1962 and 1969.

**TABLE 6e**
**Number of U.S. Medical Schools and M.D. Graduates**
**Fiscal Years 1950–1969**

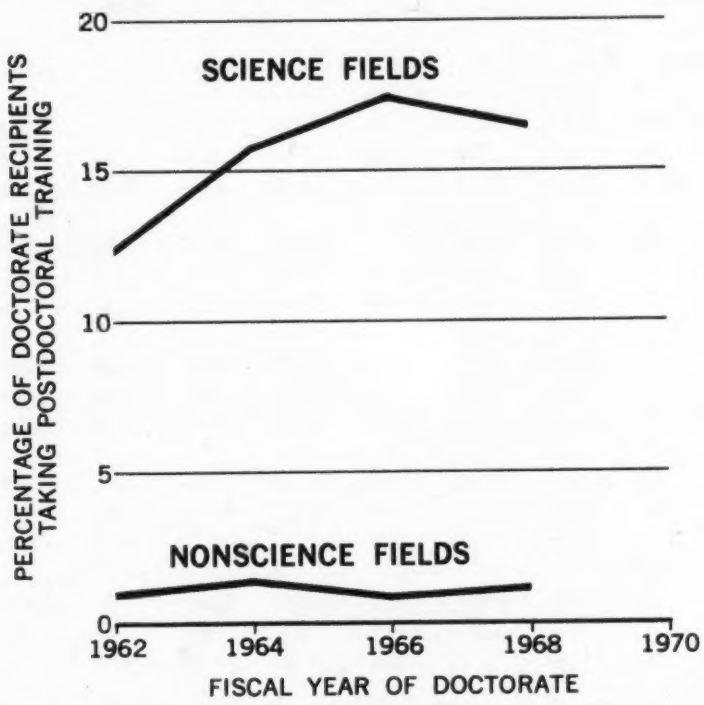
| Fiscal Year | Number of Schools | Number of M.D. Graduates | Annual Percentage Increment |
|---|---|---|---|
| 1950 | 79 | 5,553 | |
| 1951 | 79 | 6,135 | +10.5 |
| 1952 | 79 | 6,080 | — .9 |
| 1953 | 79 | 6,668 | + 9.7 |
| 1954 | 80 | 6,861 | + 2.9 |
| 1955 | 81 | 6,977 | + 1.7 |
| 1956 | 82 | 6,845 | — 1.9 |
| 1957 | 85* | 6,796 | — .7 |
| 1958 | 85* | 6,861 | + 1.0 |
| 1959 | 85* | 6,860 | 0.0 |
| 1960 | 85 | 7,081 | + 3.2 |
| 1961 | 86 | 6,994 | — 1.2 |
| 1962 | 87* | 7,168 | + 2.5 |
| 1963 | 87* | 7,264 | + 1.0 |
| 1964 | 87* | 7,336 | + 1.0 |
| 1965 | 88* | 7,409 | + 1.9 |
| 1966 | 88* | 7,574 | + 2.2 |
| 1967 | 89* | 7,743 | + 2.2 |
| 1968 | 94* | 7,973 | + 3.0 |
| 1969 | 99* | 8,059 | + 1.1 |

*Includes schools in development.
SOURCE: *Journal of the American Medical Association*, November 24, 1969. Vol. 210, No. 8, p. 1484.

## Section 7:
**Numbers of immediate postdoctoral fellowships and traineeships**

**Figure 7.**

Percentage of doctorate recipients accepting immediate postdoctoral fellowships, traineeships, or other study appointments, FY 1962–1968.




- Immediate postdoctoral study is almost entirely confined to the physical sciences and biosciences. Over four-fifths of all immediate postdoctorals are in these two summary fields.
- Between FY 1962 and FY 1966, the percentage of doctorate recipients continuing with immediate postdoctoral study increased from 8.5% to 11.5%. It dropped slightly to 11.0% in FY 1968. (See Figure 14, describing Federal funding of fellowships and traineeships.)
- The percentage of women doctorate recipients receiving postdoctoral fellowships and traineeships was the same as or higher than the percentage of men, field by field.
- Doctorate recipients in the seven selected bioscience subfields who had received NIGMS predoctoral training support were much more likely to accept immediate postdoctoral fellowships or traineeships than were non-NIGMS-supported PhD's in these fields.
- The doctorate recipients of FY 1967–1969, who completed their undergraduate training in the United States, received baccalaureate degrees from 1240 U.S. institutions. Those with doctorates in education received baccalaureates from 1025 different institutions, but the doctorate recipients in classics received baccalaureate degrees from only 136 institutions. Most PhD fields draw from less than 500 baccalaureate institutions—not necessarily the same 500 for each field.
- Although the Office of Education data in the American Council on Education's publication, *A Fact Book on Higher Education*, lists 278 U.S. institutions offering doctoral programs in FY 1968, only 234 of these had granted one or more research doctorates during the period FY 1967–1969. Research doctorates in most fields are granted in less than 100 institutions.
- Doctoral programs in fields such as mathematics, chemistry, and physics are available from most PhD-granting institutions in each geographic region, but programs in other fields such as classics, philosophy, fine arts, and theology may be available from only a very few institutions in a given geographic region.
- NIGMS training programs have reached most of the PhD-granting institutions in the seven selected bioscience fields.

**TABLE 7a**
**Number of Doctorate Recipients Accepting Immediate Postdoctoral Fellowships, Traineeships, or Other Study Appointments, by Field and Sex, FY 1962–1968**

| Field of PhD | | 1962 | | | 1964 | | | 1966 | | | 1968 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | Fem. | Total | Male | Fem. | Total | Male | Fem. | Total | Male | Fem. | Total |
| Physical Sciences | PhD's* | 1907 | 80 | 1987 | 2643 | 109 | 2752 | 3235 | 149 | 3384 | 4041 | 189 | 4230 |
| | Postdoc. | 315 | 16 | 331 | 557 | 24 | 581 | 748 | 48 | 796 | 823 | 43 | 866 |
| | % P-Doc. | 16.5 | 20.0 | 16.7 | 21.1 | 22.0 | 21.1 | 23.1 | 32.2 | 23.5 | 20.4 | 22.8 | 20.5 |
| Engi-neering | PhD's | 965 | 2 | 967 | 1500 | 9 | 1509 | 2062 | 7 | 2069 | 2666 | 11 | 2677 |
| | Postdoc. | 36 | 1 | 37 | 91 | 1 | 92 | 119 | 0 | 119 | 124 | 1 | 125 |
| | % P-Doc. | 3.7 | – | 3.8 | 6.1 | – | 6.1 | 5.8 | 0 | 5.8 | 4.7 | – | 4.7 |
| Bio-Ag-Health Sciences | PhD's | 1401 | 140 | 1541 | 1863 | 201 | 2064 | 2237 | 290 | 2527 | 2951 | 438 | 3389 |
| | Postdoc. | 249 | 36 | 285 | 477 | 58 | 535 | 603 | 124 | 727 | 865 | 184 | 1049 |
| | % P-Doc. | 17.8 | 25.7 | 18.5 | 25.6 | 28.9 | 25.9 | 27.0 | 42.8 | 28.8 | 29.3 | 42.0 | 31.0 |
| Social Sciences | PhD's | 1313 | 170 | 1483 | 1814 | 280 | 2094 | 2096 | 356 | 2452 | 2760 | 496 | 3256 |
| | Postdoc. | 77 | 8 | 85 | 106 | 18 | 124 | 141 | 36 | 177 | 172 | 34 | 206 |
| | % P-Doc. | 5.9 | 4.7 | 5.7 | 5.8 | 6.4 | 5.9 | 6.7 | 10.1 | 7.2 | 6.2 | 6.9 | 6.3 |
| Arts & Human. | PhD's | 1050 | 208 | 1258 | 1536 | 284 | 1820 | 1893 | 431 | 2324 | 2347 | 631 | 2978 |
| | Postdoc. | 17 | 1 | 18 | 28 | 5 | 33 | 20 | 11 | 31 | 22 | 12 | 34 |
| | % P-Doc. | 1.6 | – | 1.4 | 1.8 | – | 1.8 | 1.1 | 2.6 | 1.3 | .9 | 1.9 | 1.1 |
| Prof. Fields | PhD's | 336 | 36 | 372 | 437 | 35 | 472 | 547 | 55 | 602 | 685 | 77 | 762 |
| | Postdoc. | 3 | 2 | 5 | 6 | 1 | 7 | 1 | 0 | 1 | 7 | 4 | 11 |
| | % P-Doc. | – | – | – | 1.4 | – | 1.5 | – | – | – | 1.0 | – | 1.4 |
| Educa-tion | PhD's | 1208 | 268 | 1476 | 1759 | 407 | 2166 | 2318 | 511 | 2829 | 3061 | 731 | 3792 |
| | Postdoc. | 6 | 2 | 8 | 13 | 7 | 20 | 10 | 5 | 15 | 26 | 9 | 35 |
| | % P-Doc. | .5 | – | .5 | .7 | 1.7 | .9 | .4 | 1.0 | .5 | .8 | 1.2 | .9 |
| Other Fields | PhD's | 4 | 0 | 4 | 18 | 2 | 20 | 21 | 0 | 21 | 43 | 2 | 45 |
| | Postdoc. | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 2 | 3 | 0 | 3 |
| | % P-Doc. | – | – | – | – | – | – | – | – | – | – | – | – |
| Total, All Fields | PhD's | 8184 | 904 | 9088 | 11570 | 1327 | 12897 | 14409 | 1799 | 16208 | 18554 | 2575 | 21129 |
| | Postdoc. | 704 | 66 | 770 | 1279 | 114 | 1393 | 1644 | 224 | 1868 | 2042 | 287 | 2329 |
| | %P-Doc. | 8.6 | 7.3 | 8.5 | 11.0 | 8.6 | 10.8 | 11.4 | 12.5 | 11.5 | 11.0 | 11.1 | 11.0 |
| Mathe-matics | PhD's | 299 | 17 | 316 | 511 | 32 | 543 | 664 | 40 | 704 | 852 | 37 | 889 |
| | Postdoc. | 29 | 0 | 29 | 35 | 3 | 38 | 46 | 1 | 47 | 43 | 1 | 44 |
| | % P-Doc. | 9.7 | 0 | 9.2 | 6.8 | – | 7.0 | 6.9 | – | 6.7 | 5.0 | – | 4.9 |
| Physics | PhD's | 540 | 12 | 552 | 752 | 7 | 759 | 939 | 19 | 958 | 1248 | 24 | 1272 |
| | Postdoc. | 83 | 4 | 87 | 151 | 0 | 151 | 241 | 8 | 249 | 272 | 3 | 275 |
| | % P-Doc. | 15.4 | – | 15.8 | 20.1 | 0 | 19.9 | 25.7 | 42.1 | 26.0 | 21.8 | – | 21.6 |
| Chem-istry | PhD's | 867 | 48 | 915 | 1104 | 65 | 1169 | 1277 | 80 | 1357 | 1551 | 120 | 1671 |
| | Postdoc. | 189 | 11 | 200 | 351 | 21 | 372 | 411 | 36 | 447 | 467 | 39 | 506 |
| | % P-Doc. | 21.8 | 22.9 | 21.9 | 31.8 | 32.3 | 31.8 | 32.2 | 45.0 | 32.9 | 30.1 | 32.5 | 30.3 |
| Bio-Sciences | PhD's | 1046 | 138 | 1184 | 1403 | 181 | 1584 | 1697 | 270 | 1967 | 2252 | 408 | 2660 |
| | Postdoc. | 229 | 36 | 265 | 446 | 58 | 504 | 562 | 123 | 685 | 803 | 182 | 985 |
| | % P-Doc. | 21.9 | 26.1 | 22.4 | 31.8 | 32.0 | 31.8 | 33.1 | 45.6 | 34.8 | 35.7 | 44.6 | 37.0 |

*PhD's whose first postdoctoral status was known. This figure excludes PhD's whose plans were uncertain. Percentages not computed where the number of postdoctorals was less than 5.

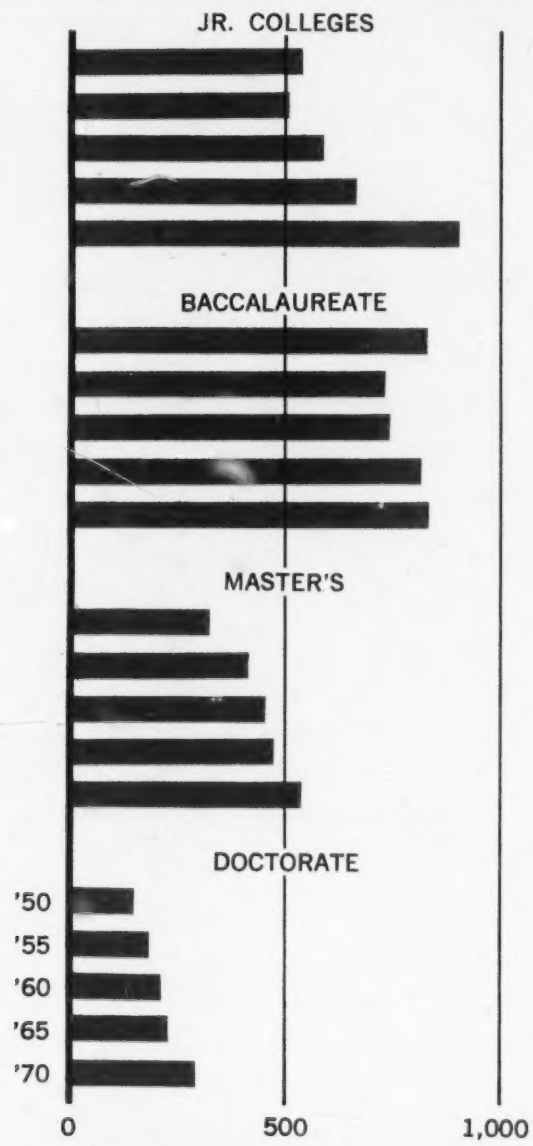
**Table 7b.**
**Percentage of doctorate recipients continuing with immediate postdoctoral study, 7 bioscience subfields, NIGMS-supported vs. non-NIGMS-supported, FY 1963–1969**

| Field of PhD | Support Status in Grad. School | Percentage of doctorate recipients accepting immediate postdoctoral fellowships, traineeships, or other study appointments, by fiscal year of doctorate | | | | | | | Total, all years | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | No. of PhD's | No. of Postdocs | % Postdocs |
| Anatomy | NIGMS | 24 | 42 | 35 | 24 | 40 | 30 | 41 | 285 | 100 | 35 |
| | Non-NIGMS | 6 | 20 | 18 | 16 | 15 | 26 | 27 | 269 | 51 | 19 |
| Biochemistry | NIGMS | 62 | 60 | 63 | 63 | 62 | 66 | 74 | 1,533 | 992 | 65 |
| | Non-NIGMS | 34 | 38 | 37 | 37 | 46 | 44 | 53 | 1,616 | 683 | 42 |
| Biophysics | NIGMS | 67 | 57 | 56 | 62 | 65 | 65 | 59 | 297 | 182 | 61 |
| | Non-NIGMS | 33 | 26 | 35 | 45 | 37 | 45 | 40 | 221 | 86 | 39 |
| Genetics | NIGMS | 56 | 38 | 48 | 44 | 45 | 45 | 50 | 276 | 129 | 47 |
| | Non-NIGMS | 23 | 26 | 22 | 18 | 23 | 19 | 40 | 556 | 134 | 24 |
| Microbiology | NIGMS | 50 | 35 | 41 | 51 | 49 | 47 | 59 | 713 | 348 | 49 |
| | Non-NIGMS | 23 | 20 | 25 | 30 | 25 | 35 | 36 | 1,325 | 374 | 28 |
| Pharmacology | NIGMS | 36 | 41 | 51 | 58 | 44 | 41 | 62 | 424 | 209 | 49 |
| | Non-NIGMS | 20 | 24 | 23 | 18 | 37 | 42 | 33 | 351 | 102 | 29 |
| Physiology | NIGMS | 40 | 45 | 45 | 38 | 44 | 46 | 59 | 733 | 344 | 47 |
| | Non-NIGMS | 20 | 24 | 26 | 22 | 31 | 28 | 40 | 866 | 245 | 28 |
| Total, 7 fields | NIGMS | 52 | 49 | 51 | 53 | 53 | 53 | 62 | 4,261 | 2,304 | 54 |
| | Non-NIGMS | 25 | 28 | 28 | 29 | 33 | 35 | 42 | 5,204 | 1,675 | 32 |

**SOURCE:** National Research Council, Office of Scientific Personnel, Doctorate Records File.

## Section 8:
### Institutions

**Figure 8.**
Number of U.S. colleges and universities, by highest level of degree offered, 1950–1970.




**ACADEMIC INSTITUTIONS BY HIGHEST LEVEL OF DEGREE OFFERED**

- The total number of institutions of higher education in the U.S. increased 37% in the period 1950–1968.
- The number of institutions offering doctoral level programs almost doubled between 1950 and 1968. During the same interval, the number of institutions offering the master's degrees—but not doctorate degrees—increased 57%, and the number of U.S. medical schools increased 19%, from 79 to 94.
- The apparent stability in the number of institutions offering baccalaureates, but not graduate degrees, represents an equilibrium between losses to the group by those that became master's granting and gains to the group from former junior colleges that now offer baccalaureates.
- The net gain in number of junior colleges during the period was 60%.

**TABLE 8a**
**Number of U.S. Colleges and Universities, by Highest Level of Degree Offered, FY 1950–1970**

| Type of Institution | Year | | | | |
|---|---|---|---|---|---|
| | 1950 | 1955 | 1960 | 1965 | 1970 |
| Junior Colleges | 541 | 510 | 593 | 664 | 903 |
| Baccalaureate Institutions | 828 | 732 | 741 | 823 | 835 |
| Master's Institutions | 324 | 415 | 455 | 472 | 517 |
| Doctoral Institutions | 148 | 180 | 210 | 227 | 296 |
| Other Institutions | 17 | 18 | 31 | 21 | — |
| Total, All Institutions | 1,858 | 1,855 | 2,028 | 2,207 | 2,551 |

SOURCE: American Council on Education, *A Fact Book on Higher Education* and *Education Directory, Higher Education, 1969–70,* U.S. Office of Education

**TABLE 8b.**
**Number of U.S. baccalaureate source institutions* for doctorate recipients, by field of PhD, by fiscal year of PhD**

| Field of PhD | Fiscal Years of Doctorates | | | |
|---|---|---|---|---|
| | 1958–60 | 1961–63 | 1964–66 | 1967–69 |
| Mathematics | 251 | 317 | 418 | 506 |
| Physics | 291 | 354 | 392 | 461 |
| Chemistry | 524 | 559 | 647 | 679 |
| Earth Sciences | 164 | 192 | 212 | 281 |
| Engineering | 197 | 234 | 270 | 342 |
| Agriculture | 127 | 128 | 145 | 166 |
| Health Sciences | 98 | 110 | 148 | 217 |
| Biochem, Biophys, Physiol, Biostat. | 351 | 391 | 512 | 575 |
| Anat, Cytol, Entom, Genet, Microbiol, Embry. | 305 | 357 | 437 | 565 |
| Ecology, Hydrobiology | 70 | 91 | 93 | 166 |
| Botany, Zoology, Gen. Biol. | 295 | 337 | 402 | 473 |
| Psychology | 419 | 453 | 526 | 627 |
| Anthropology, Archeology | 80 | 95 | 112 | 156 |
| Sociology | 207 | 214 | 281 | 346 |
| Economics | 242 | 293 | 341 | 407 |
| Political Science | 217 | 272 | 323 | 392 |
| History | 367 | 384 | 505 | 563 |
| Eng. & Am. Lit. | 350 | 409 | 503 | 625 |
| Modern Languages | 190 | 199 | 278 | 369 |
| Classics | 67 | 88 | 115 | 136 |
| Philosophy | 181 | 190 | 224 | 287 |
| Speech | 209 | 237 | 290 | 330 |
| Fine Arts & Music | 170 | 178 | 208 | 261 |
| Business Administration | 177 | 208 | 272 | 321 |
| Religion & Theology | 217 | 230 | 269 | 320 |
| Education | 761 | 833 | 925 | 1025 |
| All fields | 1024 | 1082 | 1163 | 1240 |

*"Baccalaureate source" includes all institutions within the United States, granting baccalaureate or higher degrees, that were sources of baccalaureate degrees for the doctorate recipients of the specified time period and field.
SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

**TABLE 8c.**
**Number of PhD-granting institutions*, by field of PhD, by fiscal year of PhD**

| Field of PhD | Fiscal Years of Doctorates | | | |
|---|---|---|---|---|
| | 1958–60 | 1961–63 | 1964–66 | 1967–69 |
| Mathematics | 75 | 86 | 102 | 124 |
| Physics | 80 | 97 | 121 | 147 |
| Chemistry | 114 | 134 | 151 | 167 |
| Earth Sciences | 56 | 62 | 80 | 96 |
| Engineering | 76 | 85 | 106 | 126 |
| Agriculture | 47 | 47 | 56 | 58 |
| Health Sciences | 43 | 49 | 57 | 74 |
| Biochem, Biophys, Physiol, Biostat. | 98 | 117 | 140 | 157 |
| Anat, Cytol, Entom, Genet, Microbiol, Embry. | 101 | 117 | 127 | 146 |
| Ecology, Hydrobiology | 42 | 54 | 58 | 76 |
| Botany, Zoology, Gen. Biol. | 79 | 88 | 104 | 128 |
| Psychology | 87 | 103 | 115 | 138 |
| Anthropology, Archeology | 27 | 28 | 38 | 52 |
| Sociology | 60 | 62 | 68 | 80 |
| Economics | 72 | 83 | 91 | 103 |
| Political Science | 58 | 70 | 72 | 88 |
| History | 75 | 84 | 99 | 107 |
| Eng. & Am. Lit. | 75 | 78 | 97 | 115 |
| Modern Languages | 53 | 60 | 68 | 79 |
| Classics | 26 | 32 | 38 | 40 |
| Philosophy | 47 | 52 | 63 | 79 |
| Speech | 30 | 35 | 37 | 43 |
| Fine Arts & Music | 37 | 41 | 47 | 53 |
| Business Administration | 37 | 39 | 47 | 63 |
| Religion & Theology | 28 | 33 | 32 | 41 |
| Education | 100 | 107 | 120 | 134 |
| All fields | 173 | 193 | 220 | 234 |

*"PhD-granting" indicates an institution within the United States which has granted at least one research doctorate in the field during the specified time period.
SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

**TABLE 8d.**
**Number of PhD-granting institutions for PhD's of FY 1967–1969, by region of U.S., by field of PhD**

| Field of PhD | Geographic Location of PhD-granting Institutions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | New England | Mid-Atlantic | East No. Central | West No. Central | South Atlantic | East So. Central | West So. Central | Mountain | Pacific | Total |
| Mathematics | 13 | 23 | 15 | 9 | 20 | 7 | 12 | 11 | 14 | 124 |
| Physics | 17 | 28 | 18 | 10 | 22 | 6 | 12 | 15 | 19 | 147 |
| Chemistry | 20 | 32 | 21 | 14 | 23 | 9 | 14 | 16 | 18 | 167 |
| Earth Sci. | 9 | 15 | 12 | 10 | 10 | 1 | 10 | 14 | 15 | 96 |
| Engineering | 13 | 24 | 17 | 10 | 15 | 8 | 11 | 13 | 15 | 126 |
| Agriculture | 6 | 4 | 7 | 7 | 10 | 5 | 4 | 6 | 9 | 58 |
| Health Sci. | 8 | 14 | 15 | 7 | 9 | 2 | 6 | 3 | 10 | 74 |
| Biochem, Biophys, Physiol, Biostat. | 15 | 33 | 23 | 13 | 23 | 9 | 10 | 12 | 19 | 157 |
| Anat, Cytol, Entom, Genet, Microbiology, Embryology | 15 | 29 | 18 | 13 | 24 | 8 | 11 | 12 | 16 | 146 |
| Ecology, Hydrobiology | 5 | 13 | 10 | 6 | 11 | 4 | 6 | 9 | 12 | 76 |
| Botany, Zool, Gen. Biol. | 15 | 19 | 16 | 12 | 20 | 9 | 9 | 12 | 16 | 128 |
| Psychology | 13 | 24 | 24 | 11 | 18 | 8 | 12 | 12 | 16 | 138 |
| Anthropology, Archeology | 4 | 15 | 11 | 6 | 3 | | 2 | 3 | 8 | 52 |
| Sociology | 9 | 15 | 14 | 9 | 10 | 4 | 4 | 5 | 10 | 80 |
| Economics | 10 | 19 | 14 | 11 | 16 | 6 | 10 | 5 | 12 | 103 |
| Political Science | 9 | 20 | 12 | 7 | 15 | 4 | 6 | 5 | 10 | 88 |
| History | 11 | 18 | 18 | 9 | 16 | 7 | 7 | 7 | 14 | 107 |
| Eng. & Am. Lit. | 8 | 21 | 20 | 8 | 16 | 10 | 10 | 7 | 15 | 115 |
| Modern Lang. | 7 | 15 | 11 | 7 | 13 | 3 | 6 | 6 | 11 | 79 |
| Classics | 5 | 11 | 9 | 3 | 3 | 1 | 2 | 1 | 5 | 40 |
| Philosophy | 8 | 21 | 16 | 7 | 9 | 1 | 4 | 2 | 11 | 79 |
| Speech | 1 | 8 | 13 | 4 | 3 | 1 | 4 | 4 | 5 | 43 |
| Fine Arts & Music | 4 | 10 | 11 | 5 | 6 | 1 | 7 | 3 | 6 | 53 |
| Business Adminis. | 3 | 11 | 12 | 7 | 10 | 3 | 7 | 4 | 6 | 63 |
| Religion & Theology | 5 | 15 | 7 | 1 | 6 | 1 | 1 | 1 | 4 | 41 |
| Education | 8 | 19 | 25 | 12 | 17 | 10 | 14 | 15 | 14 | 134 |
| Unduplicated Total of Inst. | 25 | 53 | 33 | 16 | 31 | 11 | 18 | 18 | 29 | 234 |

**SOURCE:** National Research Council, Office of Scientific Personnel, Doctorate Records File.

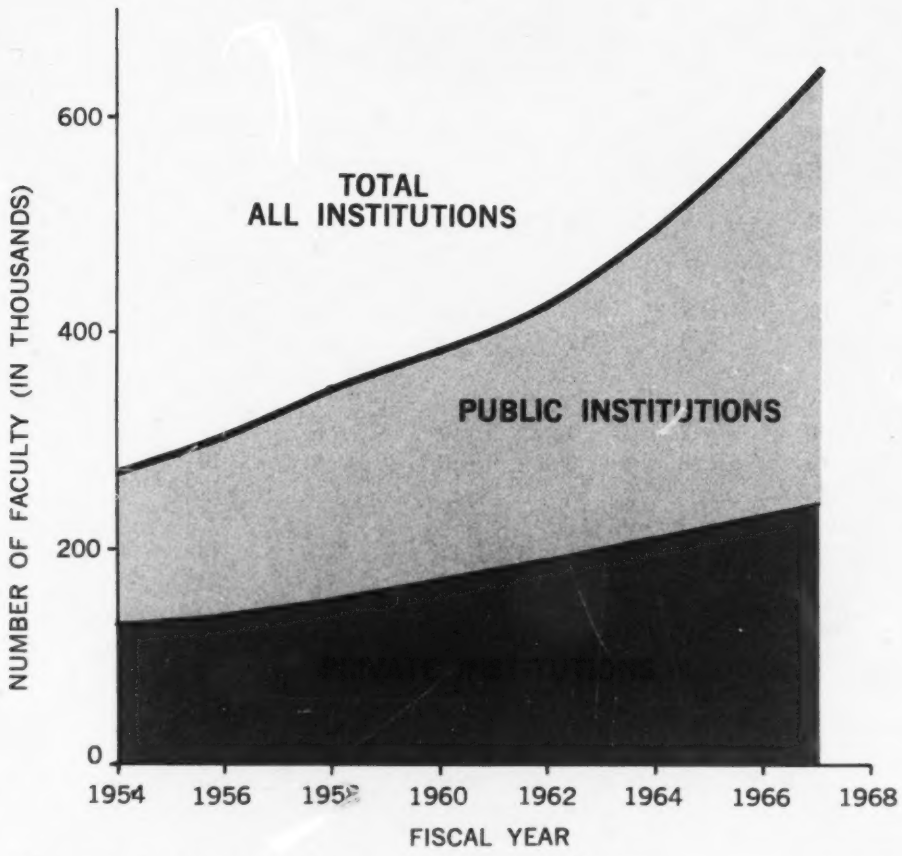
**TABLE 8e**
**Number of PhD-granting Institutions, by Region of the U.S., for PhD's of FY 1967–1969, NIGMS-supported vs. all PhD's in 7 Selected Bioscience Fields**

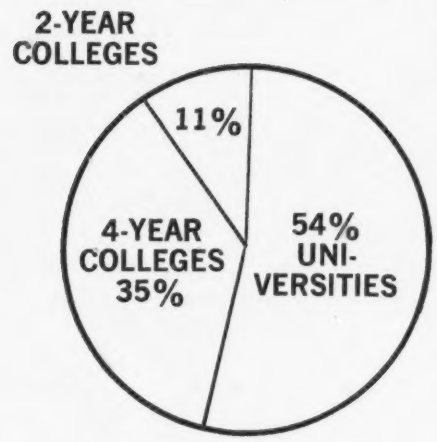
| Region | | Number of Institutions Granting PhD's in: | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Anatomy | Biochem | Biophysics | Genetics | Microbiol | Pharmacol | Physiol |
| New England | NIGMS | 5 | 12 | 5 | 4 | 9 | 7 | 8 |
| | Total | 6 | 15 | 9 | 7 | 13 | 10 | 14 |
| Middle Atlantic | NIGMS | 9 | 19 | 9 | 6 | 14 | 15 | 14 |
| | Total | 14 | 30 | 12 | 11 | 22 | 16 | 25 |
| East North Central | NIGMS | 8 | 14 | 7 | 7 | 14 | 11 | 14 |
| | Total | 12 | 19 | 9 | 12 | 17 | 13 | 19 |
| West North Central | NIGMS | 4 | 10 | 2 | 1 | 10 | 5 | 7 |
| | Total | 8 | 13 | 3 | 8 | 10 | 8 | 10 |
| South Atlantic | NIGMS | 4 | 16 | 5 | 5 | 12 | 5 | 13 |
| | Total | 9 | 19 | 5 | 12 | 20 | 11 | 23 |
| East South Central | NIGMS | 5 | 7 | 2 | 0 | 5 | 5 | 5 |
| | Total | 6 | 9 | 3 | 1 | 8 | 5 | 8 |
| West South Central | NIGMS | 3 | 7 | 2 | 2 | 8 | 5 | 8 |
| | Total | 4 | 10 | 3 | 6 | 11 | 5 | 8 |
| Mountain | NIGMS | 3 | 3 | 0 | 3 | 5 | 3 | 4 |
| | Total | 4 | 10 | 3 | 7 | 9 | 3 | 4 |
| Pacific | NIGMS | 6 | 13 | 8 | 10 | 13 | 5 | 12 |
| | Total | 8 | 16 | 12 | 13 | 14 | 8 | 14 |
| U.S. Total | NIGMS | 47 | 101 | 40 | 38 | 90 | 61 | 85 |
| | Total | 71 | 141 | 59 | 77 | 124 | 79 | 125 |
| | % NIGMS | 66 | 72 | 68 | 49 | 73 | 77 | 68 |

**SOURCE:** National Research Council, Office of Scientific Personnel, Doctorate Records File.
NIGMS Statement of Appointment of Trainee and Fellowship Awards.

## Section 9:
### Faculty

**Figure 9.**—Number of higher education faculty, or type of institution, 1954–1967.




DISTRIBUTION OF FACULTY IN 1967

Up-to-date data describing professional characteristics of higher education staff are not available. Based on three-to-six-year-old data, one may estimate that:

- The number of higher education faculty doubled between FY 1954 and FY 1967.
- The percentage of all faculty employed in public institutions has been increasing. In FY 1954, 52% of the faculty were in public institutions, but by FY 1967, this had increased to 62%.
- Approximately 5/9 of the faculty are in universities, 3/9 in four-year colleges, and 1/9 in two-year colleges.
- More than 4/5 of the faculty are men.
- Approximately 3/4 of the faculty teach, and the remainder perform various administrative duties.
- Over half of the faculty in the colleges and universities hold doctorates; less than 1/10 of the two-year college faculty have doctorates.

**TABLE 9a.**
**Number of higher education faculty, by type of control, by type of institution, FY 1954–1967**

| Fiscal Year | Faculty and Other Professional Staff* Number of Different Persons | | |
|---|---|---|---|
| | Total | Public | Private |
| 1954 | 268,028 | 140,273 | 127,755 |
| 1956 | 301,582 | 161,345 | 140,237 |
| 1958 | 348,509 | 189,834 | 158,675 |
| 1960 | 382,664 | 209,643 | 173,021 |
| 1962 | 427,833 | 235,851 | 191,982 |
| 1964 | 498,359 | 288,165 | 210,194 |
| 1967 | 650,198 | 402,898 | 247,300 |
| University | 352,640 | 241,647 | 110,993 |
| 4-yr college | 223,306 | 100,463 | 122,843 |
| 2-yr college | 74,252 | 60,788 | 13,464 |

*Includes full- and part-time faculty for resident instruction in degree-credit and other courses; professional staff for general administration, student personnel services, library, organized research; professional staff in elementary and secondary schools conducted by institutions of higher education.

SOURCE: American Council on Education, *A Fact Book on Higher Education*, Third issue, 1969, p. 9125.
U.S. Office of Education, *Numbers and Characteristics of Employees in Institutions of Higher Education*, 1966, p. 9.

**TABLE 9b.**
**Selected characteristics of teaching faculty in universities and 4-year colleges, FY 1963**

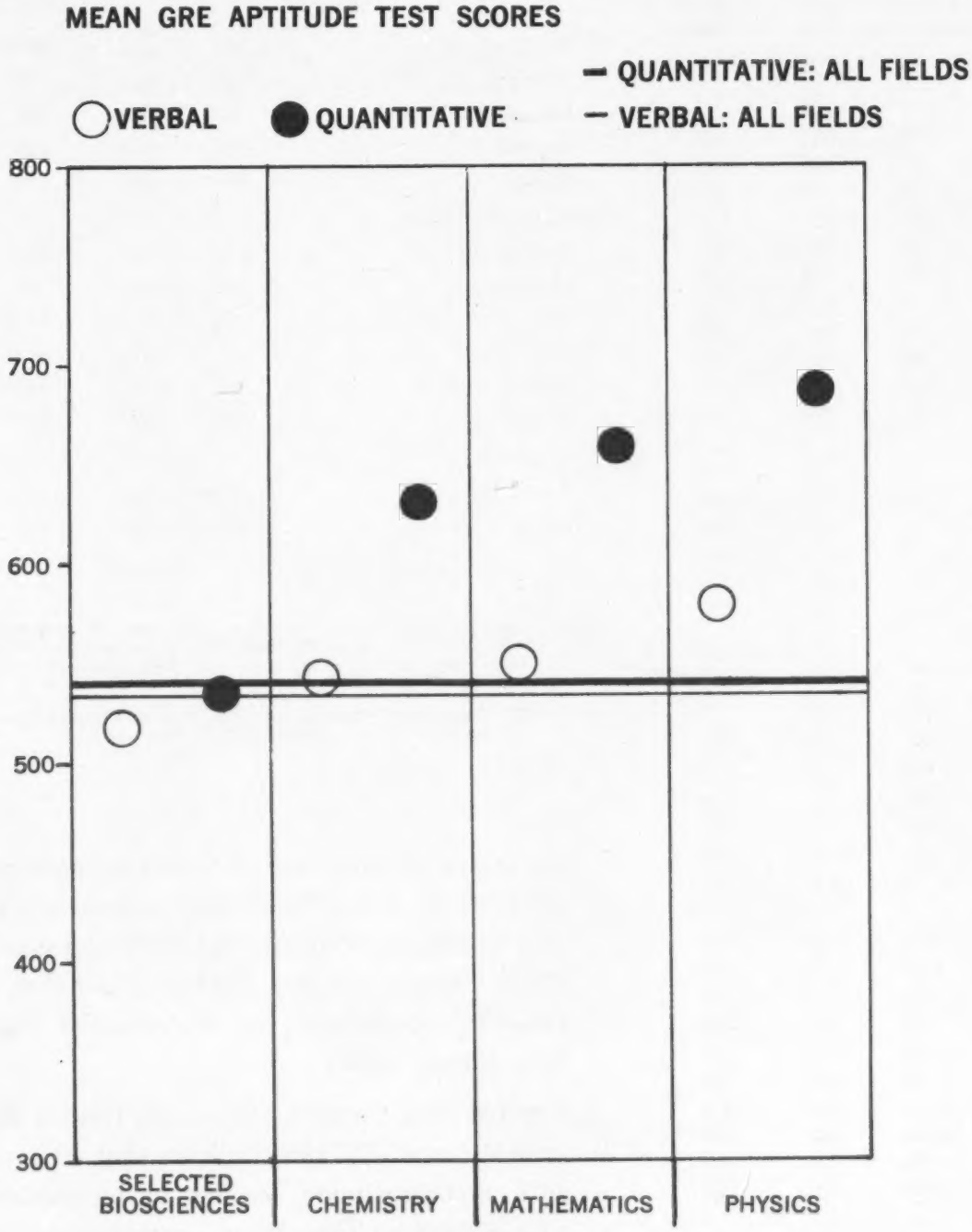
| Faculty Characteristics | Universities | | | | Other 4-year Institutions | | | | Total All Institutions | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ≥750 Faculty | | <750 Faculty | | ≥200 Faculty | | <200 Faculty | | | |
| | N | % | N | % | N | % | N | % | N | % |
| Total Teaching Faculty | 28,983 | 100.0 | 39,942 | 100.0 | 16,882 | 100.0 | 52,396 | 100.0 | 138,203 | 100.0 |
| Sex | | | | | | | | | | |
| Male | 25,718 | 88.7 | 34,416 | 86.1 | 13,980 | 82.8 | 39,446 | 75.3 | 113,560 | 82.2 |
| Female | 3,265 | 11.3 | 5,526 | 13.8 | 2,902 | 17.2 | 12,950 | 24.7 | 24,643 | 17.8 |
| Rank | | | | | | | | | | |
| Professor | 9,832 | 33.9 | 11,697 | 29.3 | 3,706 | 22.0 | 12,277 | 23.4 | 37,512 | 27.1 |
| Associate Professor | 7,373 | 25.4 | 9,931 | 24.9 | 4,149 | 24.6 | 11,387 | 21.7 | 32,840 | 23.8 |
| Assistant Professor | 7,396 | 25.5 | 11,290 | 28.2 | 5,815 | 34.4 | 15,860 | 30.3 | 40,361 | 29.2 |
| Instructor | 4,189 | 14.5 | 6,351 | 15.9 | 2,643 | 15.6 | 9,248 | 17.6 | 22,431 | 16.2 |
| Other | 194 | 0.7 | 672 | 1.7 | 569 | 3.4 | 3,624 | 6.9 | 5,059 | 3.7 |
| Teaching Area | | | | | | | | | | |
| Agriculture | 1,093 | 3.8 | 1,463 | 3.6 | 146 | 0.9 | 284 | 0.5 | 2,986 | 2.2 |
| Biological Sciences | 3,260 | 11.2 | 3,499 | 8.8 | 873 | 5.2 | 3,261 | 6.2 | 10,893 | 7.9 |
| Business and Commerce | 1,389 | 4.8 | 2,164 | 5.4 | 998 | 5.9 | 2,424 | 4.6 | 6,975 | 5.0 |
| Education | 1,610 | 5.6 | 2,330 | 5.8 | 1,629 | 9.6 | 5,148 | 9.8 | 10,717 | 7.8 |
| Engineering | 2,974 | 10.3 | 3,399 | 8.5 | 1,890 | 11.2 | 1,235 | 2.4 | 9,498 | 6.9 |
| English and Journalism | 1,556 | 5.4 | 3,055 | 7.6 | 1,375 | 8.1 | 5,812 | 11.1 | 11,798 | 8.5 |
| Fine Arts | 1,939 | 6.7 | 2,944 | 7.4 | 1,598 | 9.5 | 6,881 | 13.1 | 13,362 | 9.7 |
| Foreign Lang & Lit. | 1,393 | 4.8 | 2,085 | 5.2 | 705 | 4.2 | 3,332 | 6.4 | 7,515 | 5.4 |
| Health Fields | 2,965 | 10.2 | 3,661 | 9.2 | 338 | 2.0 | 538 | 1.0 | 7,502 | 5.4 |
| Home Economics | 393 | 1.4 | 542 | 1.4 | 262 | 1.5 | 749 | 1.4 | 1,946 | 1.4 |
| Law | 503 | 1.7 | 765 | 1.9 | 53 | 0.3 | 137 | 0.3 | 1,458 | 1.0 |
| Mathematics | 1,304 | 4.5 | 1,940 | 4.9 | 1,225 | 7.2 | 3,171 | 6.1 | 7,640 | 5.5 |
| Philosophy | 331 | 1.1 | 604 | 1.5 | 200 | 1.2 | 1,079 | 2.1 | 2,214 | 1.6 |
| Physical Education | 808 | 2.8 | 1,271 | 3.2 | 923 | 5.5 | 3,278 | 6.2 | 6,280 | 4.5 |
| Physical Sciences | 2,491 | 8.6 | 3,126 | 7.8 | 1,532 | 9.1 | 4,680 | 8.9 | 11,829 | 8.6 |
| Psychology | 908 | 3.1 | 1,031 | 2.6 | 558 | 3.3 | 1,352 | 2.6 | 3,849 | 2.8 |
| Religion & Theology | 98 | 0.3 | 599 | 1.5 | 95 | 0.6 | 1,356 | 2.6 | 2,148 | 1.6 |
| Social Sciences | 3,414 | 11.8 | 4,609 | 11.5 | 1,942 | 11.5 | 7,018 | 13.4 | 16,983 | 12.3 |
| All Other | 556 | 1.9 | 856 | 2.1 | 541 | 3.2 | 661 | 1.3 | 2,614 | 1.9 |
| Highest Educational Level | | | | | | | | | | |
| Doctorates | 18,896 | 65.1 | 21,629 | 54.1 | 8,596 | 50.9 | 20,827 | 39.7 | 69,948 | 50.6 |
| Non-doctorates | 10,087 | 34.8 | 18,312 | 45.8 | 8,286 | 49.0 | 31,569 | 60.2 | 68,254 | 49.3 |

SOURCE: U.S. Office of Education, *Teaching Faculty in Universities and 4-year Colleges*, Spring 1963, p. 64-65.

## Section 10:
*Students*

**Figure 10.**

Graduate record examination (GRE) aptitude test scores—verbal and quantitative parts—in four undergraduate major fields, FY 1964.




**Ability measures**

- Data describing numbers of student enrollments and degree recipients are readily available. However, data describing *ability* measures as related to educational progress

**TABLE 10.**

**Mean scores on GRE Verbal and Quantitative Tests, by major field of undergraduate study, FY 1964**

| Undergraduate Major Field | Number of Candidates Taking Test | Mean Score: Verbal Test | Mean Score: Quantitative Test |
|---|---|---|---|
| Biological Sciences | | | |
| Bacteriology | 278 | 504 | 539 |
| Biochemistry | 295 | 572 | 635 |
| Biology | 3,096 | 518 | 525 |
| Botany | 278 | 527 | 558 |
| Physiology | 168 | 535 | 551 |
| Zoology | 1,110 | 546 | 560 |
| Total of above | 5,225 | 527 | 542 |
| Agriculture | 785 | 421 | 505 |
| Forestry | 208 | 498 | 576 |
| Nursing | 370 | 475 | 411 |
| Pharmacy | 126 | 470 | 535 |
| Physical Sciences | | | |
| Astronomy | 55 | 611 | 695 |
| Chemistry | 3,557 | 551 | 640 |
| Geology | 717 | 549 | 599 |
| Mathematics | 4,778 | 559 | 668 |
| Natural Science | 625 | 523 | 576 |
| Physics | 3,472 | 589 | 695 |
| Engineering | | | |
| Aeronautical | 445 | 526 | 669 |
| Chemical | 955 | 524 | 695 |
| Civil | 880 | 478 | 656 |
| Electrical | 2,821 | 526 | 683 |
| Industrial | 340 | 494 | 638 |
| Mechanical | 1,511 | 504 | 669 |
| Other | 802 | 536 | 675 |
| Metallurgy | 133 | 545 | 676 |
| Mining | 14 | 480 | 589 |
| Social Sciences | | | |
| Anthropology | 353 | 619 | 529 |
| Archeology | 30 | 673 | 563 |
| Economics | 2,241 | 546 | 581 |
| Geography | 300 | 509 | 522 |
| International Studies | 270 | 593 | 549 |
| Political Science | 2,476 | 582 | 528 |
| Psychology | 5,696 | 565 | 529 |
| Social Science | 1,252 | 522 | 476 |
| Social Work | 398 | 452 | 409 |
| Sociology | 1,606 | 532 | 477 |
| Arts and Humanities | | | |
| Drama-Theater | 312 | 542 | 457 |
| English | 6,953 | 600 | 492 |
| Fine Arts | 645 | 524 | 450 |
| French | 970 | 580 | 486 |
| German | 345 | 592 | 527 |
| History | 5,367 | 569 | 495 |
| Humanities | 703 | 609 | 530 |
| Music | 1,086 | 492 | 457 |
| Philosophy | 1,017 | 621 | 565 |
| Russian | 153 | 623 | 545 |
| Scholastic Philosophy | 82 | 606 | 532 |
| Spanish | 595 | 533 | 446 |
| Speech | 551 | 501 | 433 |
| Professional Fields | | | |
| Architecture | 199 | 534 | 592 |
| Business | 2,898 | 461 | 515 |
| Home Economics | 551 | 432 | 410 |
| Journalism | 279 | 543 | 482 |
| Library Science | 496 | 516 | 425 |
| Religion | 573 | 537 | 487 |
| Education | | | |
| Education | 8,807 | 448 | 427 |
| Physical Education | 1,223 | 399 | 411 |

Note: Field differences based on these data must be interpreted with care. Only a small percentage of baccalaureate recipients elect to take GRE tests, and these are not random samples of each baccalaureate group.

SOURCE: Educational Testing Service, *Graduate Record Examinations Special Report*, August, 1965, p. 9.

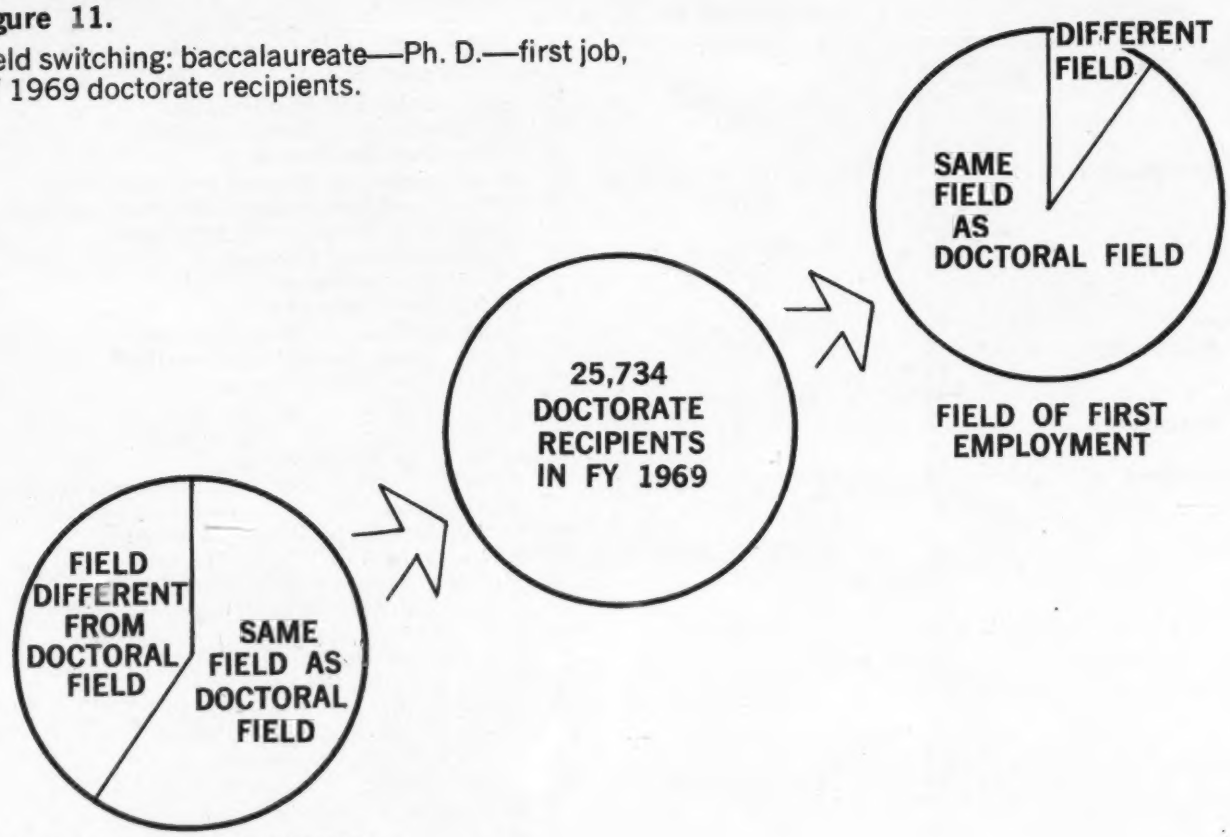
are scarce. A summary of follow-up data collected from a sample of high school graduates of 1960 by Project TALENT appears in *Human Resources and Higher Education*, p. 147–196 (published by the Russell Sage Foundation, 1970).

- Limited data from the Graduate Record Examinations of FY 1964 indicate that students with undergraduate majors in biosciences, who elected to take these examinations, do not do as well on the GRE verbal and quantitative examinations as do those with majors in mathematics, physics, and chemistry. The differences are especially marked on the quantitative examinations.

## Section 11:
### Field switching

**Figure 11.**

Field switching: baccalaureate—Ph. D.—first job, FY 1969 doctorate recipients.


FIELD DIFFERENT FROM DOCTORAL FIELD
SAME FIELD AS DOCTORAL FIELD
BACCALAUREATE SOURCE FIELD
25,734 DOCTORATE RECIPIENTS IN FY 1969
DIFFERENT FIELD
SAME FIELD AS DOCTORAL FIELD
FIELD OF FIRST EMPLOYMENT

- Field switching between baccalaureate and doctorate is common, but the shifts are among related areas. The highly quantitative fields within the physical sciences and engineering draw from one another but only minimally from non-quantitative baccalaureate fields. These quantitative fields tend to have the least BS-PhD field shifting.
- Very little field shifting occurs between doctorate and first postdoctoral job. Doctorate recipients of FY 1969 were able to utilize their graduate training in their employment.

**TABLE 11.**

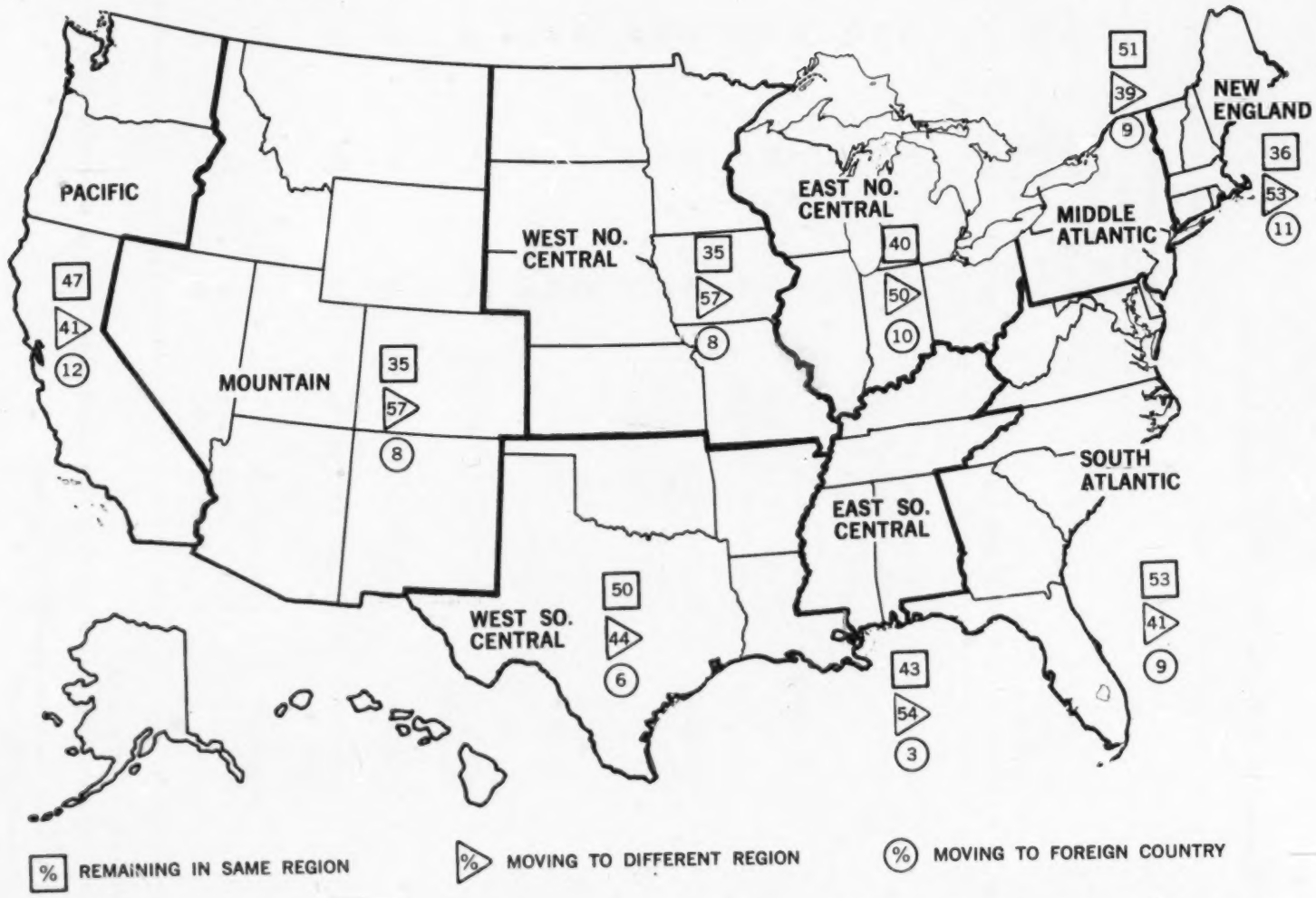
**Field switching: Baccalaureate—PhD—first job, FY 1969 doctorate recipients**

| BACCALAUREATE SOURCE FIELD (% same field as PhD; % major source other than PhD field; % other field) | | PhD FIELD (100%) | | FIELD OF FIRST POSTDOCTORAL EMPLOYMENT (% includes those PhD's accepting employment; excludes postdoctoral study and no response) |
|---|---|---|---|---|
| Mathematics | 75 | Mathematics | 70 | Same subfield of Mathematics |
| Engineering | 9 | 1,063 | 25 | Mathematics—different subfield |
| All other | 16 | | 5 | Other than Mathematics |
| Physics and Astronomy | 76 | Physics and Astronomy | 55 | Same subfield of Physics and Astronomy |
| Engineering | 12 | 1,452 | 35 | Physics and Astronomy—different subfield |
| All other | 12 | | 10 | Other than Physics and Astronomy |
| Chemistry | 86 | Chemistry | 73 | Same subfield of Chemistry |
| Engineering | 4 | 1,947 | 20 | Chemistry—different subfield |
| All other | 9 | | 7 | Other than Chemistry |
| Earth Sciences | 60 | Earth Sciences | 69 | Same subfield of Earth Sciences |
| Physics and Astronomy | 9 | 502 | 24 | Earth Sciences—different subfield |
| All other | 31 | | 7 | Other than Earth Sciences |
| Engineering | 87 | Engineering | 73 | Same subfield of Engineering |
| Physics and Astronomy | 5 | 3,234 | 16 | Engineering—different subfield |
| All other | 8 | | 11 | Other than Engineering |
| Agricultural Sciences | 78 | Agricultural Sciences | 69 | Same subfield of Agricultural Sciences |
| Biosciences | 5 | 707 | 7 | Agricultural Sciences—different subfield |
| All other | 16 | | 24 | Other than Agricultural Sciences |
| Health Sciences | 33 | Health Sciences | 76 | Same subfield of Health Sciences |
| Biosciences | 23 | 253 | 6 | Health Sciences—different subfield |
| All other | 44 | | 18 | Other than Health Sciences |
| Biosciences | 54 | Biosciences | 63 | Same subfield of Biosciences |
| Chemistry | 16 | 3,156 | 26 | Biosciences—different subfield |
| All other | 29 | | 11 | Other than Biosciences |
| Psychology | 67 | Psychology | 70 | Same subfield of Psychology |
| Education | 4 | 1,728 | 23 | Psychology—different subfield |
| All other | 29 | | 7 | Other than Psychology |
| Anthropology | 44 | Anthropology | 96 | Anthropology |
| Sociology | 7 | 180 | 0 | Other Social Sciences |
| All other | 48 | | 4 | All Other |
| Sociology | 46 | Sociology | 87 | Sociology |
| Psychology | 5 | 402 | 5 | Other Social Sciences |
| All other | 48 | | 8 | All other |
| Economics, Econometrics, Stat. | 51 | Economics, Econometrics, | 86 | Economics, Econometrics, Stat. |
| Mathematics | 11 | and Statistics | 5 | Other Social Sciences |
| All other | 38 | 799 | 9 | All other |
| Geography | 65 | Geography | 93 | Geography |
| Earth Sciences | 5 | 113 | 2 | Other Social Sciences |
| All other | 30 | | 4 | All other |
| Polit. Sci., Int. Rel., Area Studies | 51 | Political Sci., International | 76 | Polit. Sci., Int. Rel., Area Studies |
| History | 10 | Relations, and Area Studies | 13 | Other Social Sciences |
| All other | 39 | 603 | 11 | All other |
| Fine Arts, Music, Speech | 62 | Fine Arts, Music, and | 90 | Fine Arts, Music, Speech |
| Languages and Linguistics | 9 | Speech as a Dramatic Art | 3 | Other Arts and Humanities |
| All other | 29 | 477 | 6 | All other |
| History | 63 | History | 87 | History |
| Polit. Sci., Int. Rel., Area Studies | 5 | 881 | 9 | Other Arts and Humanities |
| All other | 32 | | 4 | All other |
| Lang., Literature, Linguistics | 71 | Languages, Literature, | 93 | Lang., Literature, Linguistics |
| Education | 3 | and Linguistics | 2 | Other Arts and Humanities |
| All other | 26 | 1,796 | 5 | All other |
| Philosophy | 62 | Philosophy | 92 | Philosophy |
| Lang., Literature, Linguistics | 6 | 295 | 1 | Other Arts and Humanities |
| All other | 31 | | 7 | All other |
| Education | 46 | Education | 61 | Same subfield of Education |
| Lang., Literature, Linguistics | 6 | 4,618 | 23 | Education—different subfield |
| All other | 48 | | 16 | Other than Education |
| Business Administration | 46 | Business Administration | 87 | Business Administration |
| Engineering | 15 | 514 | 1 | Other Professional Fields |
| All other | 39 | | 12 | All other |
| Religion and Theology | 17 | Religion and Theology | 86 | Religion and Theology |
| Philosophy | 22 | 206 | 2 | Other Professional Fields |
| All other | 61 | | 12 | All other |
| Same field | 60 | Total All Fields | 89 | Same field |
| All other | 40 | 25,734 | 11 | All other |

SOURCE: National Research Council, Office of Scientific Personnel, *Summary Report 1969.*

## Section 12:
## Geographic mobility: Baccalaureate-PhD-first postdoctoral position

Figure 12.—Geographic mobility: Ph. D. to first postdoctoral employment.




- Education and engineering are strongly state-centered professions. These two fields have the highest percentages remaining in-state throughout the various career stages. Both professions also require state certification and licensing.
- Engineering and biological sciences draw heavily from foreign baccalaureate sources. In engineering, the percentage taking first postdoctoral positions in a foreign country is much lower than the percentage of foreign baccalaureates feeding into the field. In the biological sciences, the foreign return rate is much closer to the percentage of foreign baccalaureates coming into the field.
- Few doctorate recipients from the New England and Mountain states had taken baccalaureates in these regions, and few remained in the regions for initial jobs. In contrast, over half of the doctorate recipients in the Middle Atlantic and the West South Central states had taken baccalaureates in these regions and remained in the regions for their first jobs.
- Geographic mobility (doctorate to first postdoctoral employment) of the NIGMS-supported doctorate recipients was little different from that of the non-NIGMS group except for "foreign." Since very few foreign citizens receive NIGMS predoctoral support, the percentage of NIGMS people accepting foreign postdoctoral appointments is relatively small.

**TABLE 12a.**

**Geographic mobility: baccalaureate-PhD-first postdoctoral location, by PhD field, FY 1969 doctorate recipients**

| Baccalaureate to PhD | | | | PhD to First Postdoctoral Location | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| % Bacc. from Same State as PhD | % from Same Region, Diff. State | % from Other U. S. Region | % from Foreign | Summary Field of Doctorate | Postdoctoral Status | % P. D. Location Same State as PhD | % to Same Region Diff. State | % to Other U. S. Region | % to Foreign |
| 28 | 13 | 44 | 14 | Physical Sciences | Postdoc Study[a] | 25 | 8 | 52 | 16 |
| | | | | | Postdoc Employment[b] | 26 | 15 | 52 | 6 |
| | | | | | Total Study+Employ. | 26 | 13 | 52 | 9 |
| 33 | 9 | 34 | 24 | Engineering | Postdoc Study | 51 | 1 | 26 | 22 |
| | | | | | Postdoc Employment | 34 | 12 | 47 | 7 |
| | | | | | Total Study+Employ. | 36 | 11 | 46 | 8 |
| 27 | 12 | 41 | 19 | Biological Sciences | Postdoc Study | 28 | 8 | 52 | 11 |
| | | | | | Postdoc Employment | 26 | 13 | 45 | 16 |
| | | | | | Total Study+Employ. | 27 | 11 | 48 | 14 |
| 29 | 12 | 47 | 12 | Social Sciences | Postdoc Study | 32 | 11 | 47 | 10 |
| | | | | | Postdoc Employment | 29 | 13 | 49 | 9 |
| | | | | | Total Study+Employ. | 29 | 13 | 49 | 9 |
| 30 | 13 | 48 | 9 | Arts & Humanities | Total Study+Employ.[c] | 28 | 14 | 52 | 6 |
| 44 | 14 | 37 | 5 | Education | Total Study+Employ.[c] | 45 | 14 | 35 | 5 |
| 23 | 16 | 48 | 13 | Professional Fields | Total Study+Employ.[c] | 28 | 13 | 50 | 8 |
| 31 | 12 | 42 | 13 | Total, All Fields | Postdoc Study | 29 | 8 | 49 | 14 |
| | | | | | Postdoc Employment | 32 | 14 | 46 | 8 |
| | | | | | Total Study+Employ. | 32 | 13 | 47 | 9 |

[a]Postdoctoral study=postdoctoral fellowship, traineeship, research associateship, or other study.

[b]Postdoctoral employment includes only those who have definite postdoctoral employment and stated location of employment; exclues those on postdoctoral study and those not stating location of postdoctoral employment.

[c]Study and employment status combined because numbers in postdoctoral study are small (less than 4%) in these fields.

**SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.**

**TABLE 12b.**
**Geographic mobility: baccalaureate-PhD-first postdoctoral location, by *region of PhD institution*, FY 1969 doctorate recipients***

| Baccalaureate to PhD | | | | PhD to First Postdoctoral Location | | | | |
|---|---|---|---|---|---|---|---|---|
| % Bacc. from Same State as PhD | % from Same Region Diff. State | % from Other U. S. Region | % from Foreign | Region of PhD Institution | % P.D. Location Same State as PhD | % to Same Region, Diff. State | % to Other U. S. Region | % to Foreign |
| 24 | 11 | 50 | 15 | New England | 28 | 8 | 53 | 11 |
| 41 | 11 | 33 | 14 | Mid. Atlantic | 38 | 13 | 39 | 9 |
| 29 | 15 | 41 | 14 | E. No. Central | 26 | 14 | 50 | 10 |
| 30 | 15 | 42 | 13 | W. No. Central | 23 | 12 | 57 | 8 |
| 23 | 15 | 51 | 11 | So. Atlantic | 30 | 23 | 41 | 6 |
| 37 | 12 | 43 | 7 | E. So. Central | 34 | 9 | 54 | 3 |
| 45 | 11 | 34 | 10 | W. So. Central | 39 | 11 | 44 | 6 |
| 26 | 8 | 55 | 10 | Mountain | 27 | 8 | 57 | 8 |
| 30 | 8 | 44 | 18 | Pacific | 38 | 9 | 41 | 12 |

*Data based on those who have indicated definite plans for postdoctoral study or postdoctoral employment and have stated the location of their study or employment.
SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

**TABLE 12c.**
**Geographic mobility: PhD to first postdoctoral employment, by region of PhD institution, NIGMS-supported vs. non-NIGMS-supported, FY 1969 doctorate recipients**

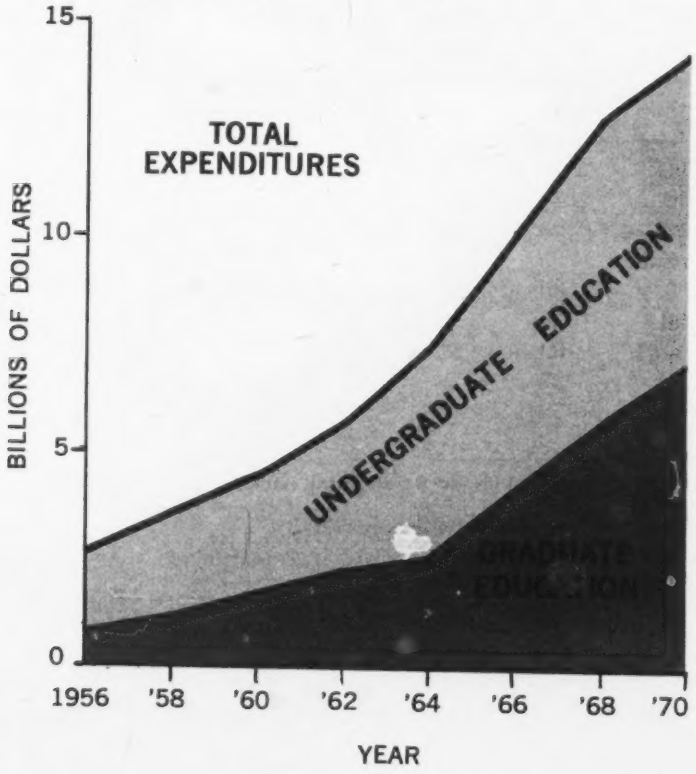
| Region of PhD Institution | % Job Same State as PhD | | % To Same Region, Diff. State | | % To Other U.S. Region | | % To Foreign | |
|---|---|---|---|---|---|---|---|---|
| | NIGMS | Non-NIGMS | NIGMS | Non-NIGMS | NIGMS | Non-NIGMS | NIGMS | Non-NIGMS |
| New England | 24 | 27 | 4 | 0 | 70 | 53 | 2 | 20 |
| Middle Atlantic | 33 | 33 | 10 | 16 | 53 | 29 | 3 | 22 |
| East North Central | 23 | 23 | 16 | 16 | 59 | 38 | 1 | 24 |
| West North Central | 15 | 40 | 11 | 6 | 68 | 40 | 5 | 14 |
| South Atlantic | 32 | 42 | 18 | 17 | 47 | 25 | 3 | 15 |
| East South Central | 36 | 48 | 21 | 5 | 43 | 43 | 0 | 5 |
| West South Central | 31 | 57 | 12 | 7 | 55 | 20 | 2 | 17 |
| Mountain | 22 | 18 | 13 | 9 | 65 | 72 | 0 | 0 |
| Pacific | 29 | 39 | 6 | 11 | 59 | 34 | 7 | 16 |
| Total, All Regions | 27 | 35 | 12 | 12 | 58 | 36 | 3 | 17 |

Note: Data excludes those on postdoctoral study and those not stating definite location of postdoctoral employment.
SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

## Section 13:
### *Expenditures for Higher Education*

**Figure 13.**

Expenditures for educational and general purposes by institutions of higher education, biennially 1956 to projected 1970.




**Total expenditures**

- Meaningful divisions between expenditures for graduate vs. undergraduate education are difficult to make. Careful studies in this area are only now getting underway. The data presented in Table 13 are labeled "estimates," and they should be so interpreted.
- Total expenditures for higher education increased fivefold between 1956 and 1970; expenditures for graduate education increased about sevenfold during the same period.
- Graduate education accounted for about one third of the higher education expenditures of 1956, but it accounted for half of the 1970 expenditures.

**TABLE 13.**
**Expenditures of U.S. institutions of higher education for educational and general purposes and estimated cost of graduate education, FY 1956–1970**

| FY Year | Total[a] Expenditures (Millions of Dollars) | Estimated Cost[b] of Graduate Education (Millions of Dollars) | Grad. Educ. as % of Total |
|---|---|---|---|
| 1956 | $2,789 | $1,000 | 28% |
| 1958 | 3,634 | 1,330 | 37 |
| 1960 | 4,536 | 1,810 | 40 |
| 1962 | 5,798 | 2,390 | 41 |
| 1964 | 7,466 | 3,110 | 42 |
| 1966 | 10,004 | 4,240 | 42 |
| 1968 | 12,700 (est) | 5,740 | 45 |
| 1970 | 14,300 (proj) | 7,070 | 49 |

[a] p. 92 *Digest of Educational Statistics, 1969* (includes states and outlying areas); p. 9106 *A Fact Book on Higher Education*, ACE 1968, 1970 data added).

[b] p. 159 *Graduate Education: Parameters for Public Policy*, National Science Board (1969).

**TABLE 14a.**
**Number of predoctoral graduate students supported and amount of Federal fellowship and traineeship support, by year, by field, FY 1961–1970**

| Field | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of persons supported in fiscal year | | | | | | | | | |
| Mathematics | 700 | 961 | 1,024 | 1,199 | 1,413 | 2,069 | 2,834 | 3,268 | 2,963 | 2,244 |
| Physical Sciences | 1,287 | 1,705 | 1,979 | 2,496 | 3,014 | 4,400 | 5,470 | 6,006 | 5,815 | 4,499 |
| Engineering | 652 | 881 | 1,074 | 1,436 | 3,131 | 4,236 | 4,852 | 5,530 | 5,075 | 4,342 |
| Biological Sciences | 1,336 | 2,482 | 2,882 | 3,615 | 3,985 | 4,884 | 6,186 | 7,412 | 7,876 | 8,046 |
| Social Sciences | 1,189 | 2,038 | 2,495 | 2,695 | 3,264 | 4,248 | 7,169 | 9,695 | 10,232 | 9,287 |
| Arts & Humanities | 1,146 | 1,836 | 2,131 | 1,934 | 1,866 | 2,740 | 4,559 | 6,319 | 6,396 | 5,054 |
| Education | 2,099 | 2,331 | 2,747 | 3,193 | 4,713 | 5,298 | 10,002 | 12,534 | 13,179 | 10,619 |
| Health Sciences | 935 | 1,366 | 1,448 | 2,143 | 2,570 | 2,827 | 3,241 | 3,740 | 3,558 | 3,884 |
| Other | 51 | 116 | 194 | 326 | 457 | 483 | 952 | 2,441 | 2,492 | 1,011 |
| Total | 9,395 | 13,716 | 15,974 | 19,037 | 24,413 | 31,185 | 45,265 | 56,945 | 57,586 | 48,986 |
| | Amount of Federal support* in fiscal year (thousands of dollars) | | | | | | | | | |
| Mathematics | 2,717 | 3,681 | 4,240 | 6,222 | 8,022 | 11,975 | 16,068 | 17,025 | 14,120 | 11,071 |
| Physical Sciences | 5,117 | 6,753 | 9,084 | 16,043 | 19,412 | 26,525 | 31,500 | 29,928 | 27,172 | 22,252 |
| Engineering | 2,684 | 3,702 | 5,147 | 11,172 | 19,150 | 25,433 | 28,457 | 28,581 | 24,282 | 22,820 |
| Biological Sciences | 5,238 | 9,362 | 11,144 | 17,254 | 18,168 | 23,611 | 30,463 | 34,077 | 36,295 | 38,171 |
| Social Sciences | 4,860 | 8,348 | 10,196 | 12,550 | 14,846 | 20,441 | 36,488 | 48,691 | 53,510 | 46,399 |
| Arts & Humanities | 5,179 | 8,344 | 9,760 | 8,882 | 8,804 | 13,633 | 24,023 | 31,127 | 32,579 | 28,124 |
| Education | 6,631 | 7,958 | 9,185 | 10,636 | 18,650 | 21,870 | 45,454 | 57,604 | 62,620 | 55,267 |
| Health Sciences | 3,925 | 4,856 | 5,525 | 9,423 | 9,824 | 11,316 | 13,919 | 15,169 | 17,964 | 18,321 |
| Other | 185 | 886 | 1,503 | 2,638 | 3,389 | 3,505 | 6,537 | 17,096 | 17,914 | 6,054 |
| Total | 36,537 | 53,890 | 65,785 | 94,820 | 120,265 | 158,310 | 232,910 | 279,299 | 286,556 | 248,479 |

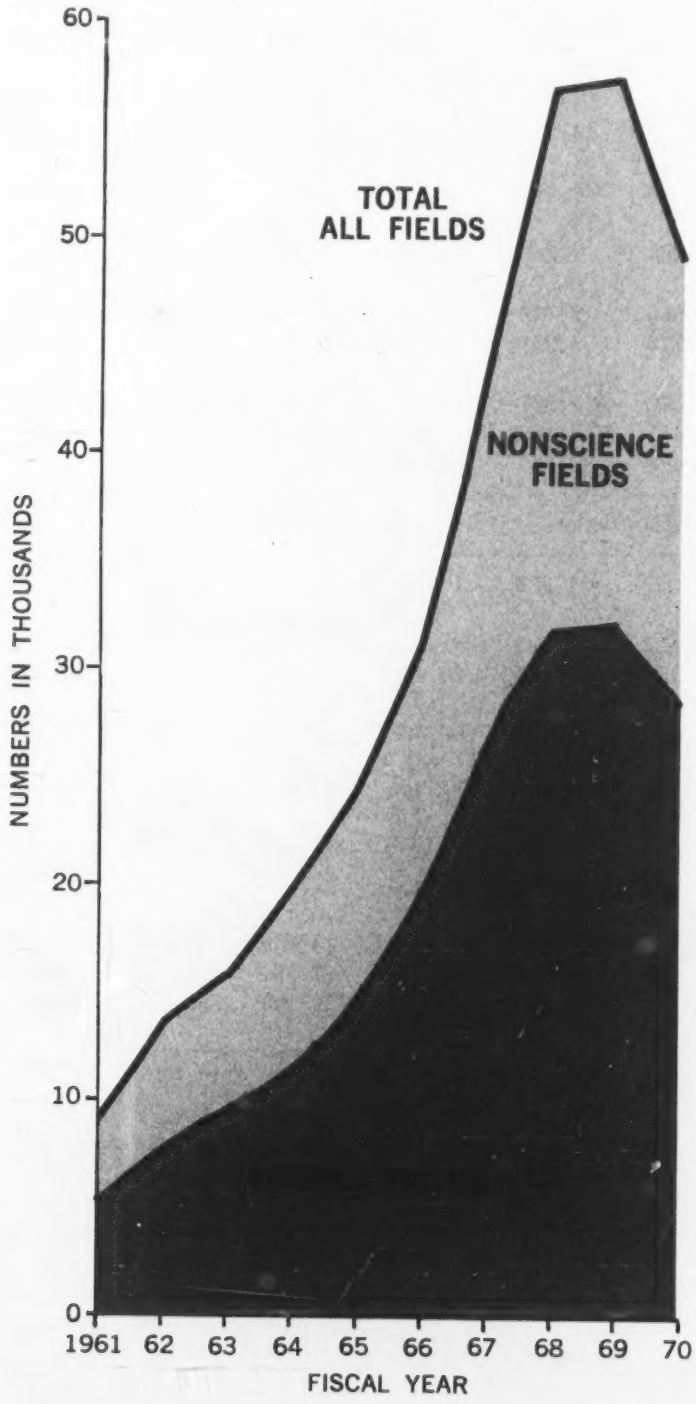
**SOURCE:** The Federal Interagency Committee on Education, *Report on Federal Predoctoral Student Support*, April 1970. Supplemental data from Mrs. Barbara Montgomery, Federal Interagency Committee on Education.

*Amounts of Federal support include institutional allowances as well as stipend and dependency support to the student.

**Note:** The sharp increase in number of dollars "Other" in 1968 and 1969 is caused by the increase in National Teaching Fellowship Program, Developing Institutions Program, Office of Education Title III. These fellowships are not distributed by academic field, and there were large numbers of them in FY 1968 and FY 1969.

## Section 14:
### Predoctoral fellowships and traineeships

**Figure 14.**
Number of predoctoral graduate students supported by federal fellowship and traineeship programs, FY 1961–1970.




- Federal support for predoctoral fellowships and traineeships grew rapidly from FY 1961 until FY 1968, but since FY 1968 this support has begun to decrease in all fields except the biosciences, and even here the rate of increase has declined markedly.
- Total dollar support increased almost sevenfold during the period FY 1961 to FY 1970, and number of persons supported increased fivefold. Mathematics and physical sciences experienced the smallest percentage increases in support during the 1960's; engineering and biosciences received the largest percentage increases.
- The number of persons supported by NIGMS traineeships and fellowships increased rapidly between FY 1958 and FY 1964, remained essentially constant through FY 1967, and decreased in FY 1968 and FY 1969.

**TABLE 14b.**
**Number of persons supported by NIGMS traineeship and fellowship programs, by FY on duty, 1958–1969**

| | Number of Persons Supported, by Type of Support* | | |
|---|---|---|---|
| FY on duty | Trainees | Fellows | Unduplicated Total** |
| 1958 | 152 | 0 | 152 |
| 1959 | 756 | 31 | 787 |
| 1960 | 1,350 | 384 | 1,728 |
| 1961 | 2,034 | 798 | 2,803 |
| 1962 | 4,379 | 977 | 5,299 |
| 1963 | 6,094 | 1,303 | 7,309 |
| 1964 | 7,472 | 1,397 | 8,792 |
| 1965 | 7,429 | 1,472 | 8,784 |
| 1966 | 7,675 | 1,814 | 9,347 |
| 1967 | 6,817 | 2,130 | 8,835 |
| 1968 | 6,339 | 2,246 | 8,513 |
| 1969 | 6,527 | 1,980 | 8,449 |

*Includes all academic fields and all academic levels—prePhD, preMD, post MD, postPhD, and all other.
**A very small number (about 1%) receive both traineeship and fellowship support during the same fiscal year.
SOURCE: NIGMS: Statement of Appointment of Trainees, and Fellowship Award Statement

### Employment Patterns of Bioscientists

Type of employer and type of primary work activity

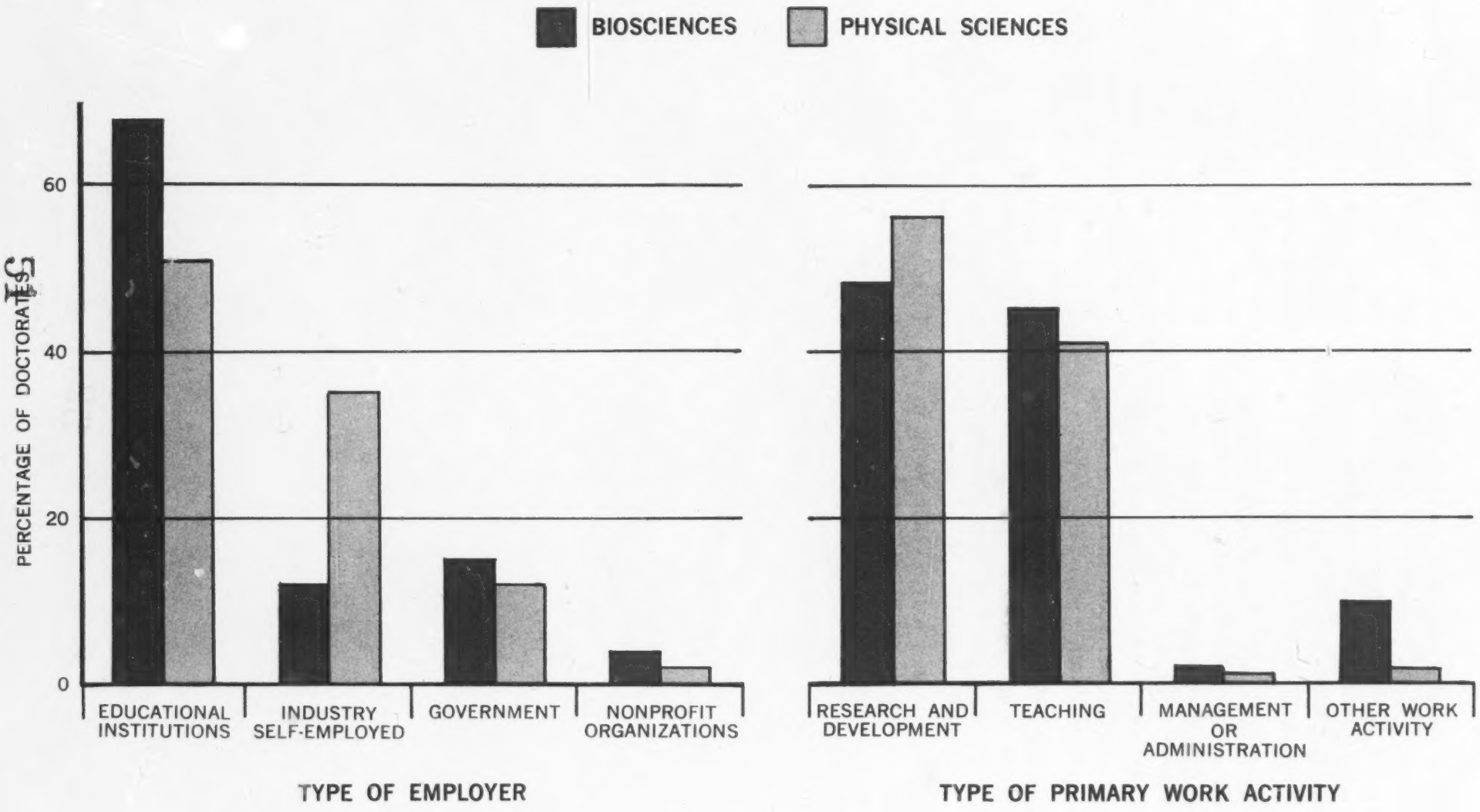
Salary

Expenditures for research

50

## Section 15:
### Type of Employer and Principal Work Activity

**Figure 15.**—Type of employer and type or primary work activity for employed doctorate bioscientists and physical scientists in 1968 National Register of Scientific and Technical Personnel.



- Educational institutions are virtually the only employers of nonscience PhD's. Science doctorate recipients distribute more broadly —about half to educational institutions, one-fourth to industry, and the remainder to governmental and nonprofit institutions.
- The primary work activities of nonscientists are teaching and administration. Despite their research doctorates, very few consider research as a primary work activity. The first postdoctoral work activities of science doctorates are divided about evenly between research and teaching.
- Comparison of PhD biological scientists with PhD physical scientists in the National Register of Scientific and Technical Personnel reveals little difference in their primary work activities (about half of each work in research), but there are marked differences in type of employer. Bioscientists are more likely to work in educational institutions or for government agencies; physical scientists are more likely to work for industry.
- Although foreign citizens among the new PhD's have the same general pattern of initial postdoctoral employment as do U.S. citizens, there are some significant differences. In the physical sciences and engineering, a larger proportion of foreign citizens go to work in academic institutions, and smaller proportions in private industry and U.S. government jobs.
- Comparison Table 15a (*immediate* postdoctoral employment: data from NRC Doctorate Records File) with 15d (all years of professional experience: data from the N.S.F. National Register) shows that doctorate recipients tend to move out of both research and teaching as careers mature. (The change is real, but slightly exaggerated in comparing T15a and T15d because of self-selection of Register respondents.) Government employees are slightly more inclined to complete Register questionnaires than are employees of colleges and universities.

**TABLE 15a.**

**Immediate postdoctoral employment for FY 1969 doctorate recipients* in 7 summary fields by citizenship**

| Field of PhD | Citizenship | Type of Employer | | | | | | | | | | | Type of Primary Work Activity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Educ. Inst. | | Indus. Self | | Gov't | | Nonprofit | | Other | | Unknown N | Total N | Research | | Teaching | | Adminis. | | Other | | Unknown N |
| | | N | % | N | % | N | % | N | % | N | % | | | N | % | N | % | N | % | N | % | |
| Physical Sciences | U. S. | 1408 | 50 | 1015 | 36 | 316 | 11 | 69 | 2 | 17 | 1 | 74 | 2899 | 1564 | 56 | 1143 | 41 | 36 | 1 | 54 | 2 | 100 |
| | Non-U.S. | 253 | 60 | 121 | 28 | 34 | 8 | 8 | 2 | 9 | 2 | 12 | 437 | 228 | 55 | 179 | 43 | 6 | 1 | 4 | 1 | 20 |
| | Total | 1661 | 51 | 1136 | 35 | 350 | 11 | 77 | 2 | 26 | 1 | 86 | 3336 | 1792 | 56 | 1322 | 41 | 42 | 1 | 58 | 2 | 120 |
| Engineering | U. S. | 665 | 31 | 1127 | 52 | 262 | 12 | 91 | 4 | 18 | 1 | 67 | 2230 | 1508 | 70 | 526 | 24 | 48 | 2 | 77 | 4 | 70 |
| | Non-U. S. | 252 | 39 | 310 | 48 | 47 | 7 | 15 | 2 | 16 | 2 | 35 | 675 | 424 | 65 | 199 | 30 | 4 | 1 | 26 | 4 | 22 |
| | Total | 917 | 33 | 1437 | 51 | 309 | 11 | 106 | 4 | 34 | 1 | 102 | 2905 | 1932 | 69 | 725 | 26 | 52 | 2 | 103 | 4 | 92 |
| Biological Sciences | U.S. | 1351 | 70 | 247 | 13 | 285 | 14 | 42 | 2 | 17 | 1 | 69 | 2011 | 896 | 46 | 884 | 45 | 48 | 2 | 117 | 6 | 64 |
| | Non-U. S. | 279 | 67 | 35 | 8 | 75 | 18 | 12 | 3 | 15 | 4 | 30 | 446 | 231 | 55 | 172 | 41 | 3 | 1 | 9 | 2 | 30 |
| | Total | 1630 | 69 | 282 | 12 | 360 | 15 | 54 | 2 | 32 | 1 | 99 | 2457 | 1127 | 48 | 1056 | 45 | 51 | 2 | 126 | 5 | 94 |
| Social Sciences | U. S. | 2204 | 75 | 137 | 5 | 384 | 13 | 188 | 6 | 35 | 1 | 98 | 3046 | 636 | 22 | 1752 | 59 | 107 | 4 | 448 | 15 | 102 |
| | Non-U. S. | 300 | 76 | 16 | 4 | 33 | 8 | 17 | 4 | 29 | 7 | 17 | 412 | 96 | 24 | 258 | 66 | 15 | 4 | 23 | 6 | 19 |
| | Total | 2504 | 75 | 153 | 5 | 417 | 12 | 205 | 6 | 64 | 2 | 115 | 3458 | 732 | 22 | 2010 | 60 | 122 | 4 | 471 | 14 | 121 |
| Arts & Humanities | U. S. | 2796 | 96 | 21 | 1 | 44 | 2 | 31 | 1 | 16 | – | 48 | 2956 | 75 | 3 | 2673 | 93 | 81 | 3 | 43 | 1 | 84 |
| | Non-U. S. | 228 | 95 | 2 | 1 | 2 | 1 | – | – | 9 | 3 | 13 | 254 | 10 | 4 | 227 | 95 | 1 | – | 2 | 1 | 14 |
| | Total | 3024 | 96 | 23 | 1 | 46 | 1 | 31 | 1 | 25 | 1 | 61 | 3210 | 85 | 3 | 2900 | 93 | 82 | 3 | 45 | 1 | 98 |
| Professional Fields | U. S. | 548 | 82 | 40 | 6 | 28 | 4 | 39 | 6 | 11 | 2 | 14 | 680 | 42 | 6 | 515 | 77 | 45 | 7 | 62 | 9 | 14 |
| | Non-U. S. | 83 | 81 | 4 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 5 | 107 | 12 | 12 | 76 | 74 | 4 | 4 | 11 | 11 | 4 |
| | Total | 631 | 82 | 44 | 6 | 32 | 4 | 44 | 6 | 17 | 2 | 19 | 787 | 54 | 7 | 591 | 77 | 49 | 6 | 73 | 9 | 18 |
| Education | U. S. | 3520 | 89 | 45 | 1 | 248 | 6 | 108 | 3 | 15 | – | 152 | 4088 | 357 | 9 | 2035 | 51 | 1200 | 30 | 354 | 9 | 134 |
| | Non-U. S. | 171 | 80 | 2 | 1 | 23 | 11 | 7 | 3 | 12 | 5 | 17 | 232 | 33 | 15 | 145 | 66 | 32 | 14 | 11 | 5 | 11 |
| | Total | 3691 | 89 | 47 | 1 | 271 | 7 | 115 | 3 | 27 | – | 169 | 4320 | 390 | 9 | 2180 | 52 | 1232 | 30 | 365 | 9 | 145 |
| Other & Unspecified | | | | | | | | | | | | | 133 | | | | | | | | | |
| Total, All Fields | U. S. | 12579 | 72 | 2647 | 15 | 1574 | 9 | 573 | 3 | 130 | 1 | 525 | 18028 | 5111 | 29 | 9587 | 55 | 1576 | 9 | 1164 | 6 | 573 |
| | Non-U. S. | 1576 | 64 | 493 | 20 | 220 | 9 | 64 | 3 | 96 | 4 | 129 | 2578 | 1043 | 42 | 1257 | 51 | 69 | 3 | 86 | 3 | 120 |
| | Total | 14155 | 71 | 3140 | 16 | 1794 | 9 | 637 | 3 | 226 | 1 | 654 | 20606 | 6154 | 31 | 10844 | 54 | 1645 | 8 | 1250 | 6 | 693 |

*Excludes those who accepted postdoctoral fellowships, traineeships, or other postdoctoral study.

Percentages based on total known type of employer or type of primary work activity.

SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

**TABLE 15b**
**Immediate postdoctoral employment for FY 1969 doctorate recipients* in 4 natural science fields, by citizenship.**

| Field of PhD | Citizenship | Type of Employer | | | | | | | | | | | Type of Primary Work Activity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Educ. Inst. | | Indus/Self | | Gov't | | Nonprofit | | Other | | Unknown N | Total N | Research | | Teaching | | Adminis. | | Other | | Unknown N |
| | | N | % | N | % | N | % | N | % | N | % | | | N | % | N | % | N | % | N | % | |
| Bioscience | U. S. | 948 | 77 | 132 | 11 | 105 | 8 | 32 | 3 | 8 | 1 | 154 | 1379 | 471 | 38 | 696 | 57 | 21 | 2 | 43 | 3 | 148 |
| | Non-U. S. | 131 | 72 | 13 | 7 | 31 | 17 | 5 | 3 | 2 | 1 | 106 | 288 | 98 | 52 | 86 | 46 | – | – | 4 | 2 | 100 |
| | Total | 1079 | 77 | 145 | 10 | 136 | 10 | 37 | 3 | 10 | 1 | 260 | 1667 | 569 | 40 | 782 | 55 | 21 | 1 | 47 | 3 | 248 |
| Chemistry | U. S. | 297 | 30 | 617 | 63 | 51 | 5 | 16 | 2 | 1 | – | 76 | 1058 | 700 | 71 | 263 | 27 | 11 | 1 | 12 | 1 | 72 |
| | Non-U. S. | 49 | 36 | 79 | 59 | 7 | 5 | – | – | – | – | 64 | 199 | 94 | 70 | 37 | 27 | 3 | 2 | 1 | 1 | 64 |
| | Total | 346 | 31 | 696 | 62 | 58 | 5 | 16 | 1 | 1 | – | 140 | 1257 | 794 | 71 | 300 | 27 | 14 | 1 | 13 | 1 | 136 |
| Mathematics | U. S. | 654 | 85 | 75 | 10 | 21 | 3 | 15 | 2 | – | – | 42 | 807 | 206 | 27 | 543 | 71 | 6 | 1 | 9 | 1 | 43 |
| | Non-U. S. | 113 | 88 | 11 | 9 | 3 | 2 | 1 | 1 | – | – | 24 | 152 | 44 | 35 | 81 | 64 | – | – | 1 | 1 | 26 |
| | Total | 767 | 86 | 86 | 10 | 24 | 3 | 16 | 2 | – | – | 66 | 959 | 250 | 28 | 624 | 70 | 6 | 1 | 10 | 1 | 69 |
| Physics | U. S. | 293 | 43 | 257 | 38 | 92 | 14 | 32 | 5 | 2 | – | 114 | 790 | 458 | 67 | 209 | 30 | 7 | 1 | 13 | 2 | 103 |
| | Non-U. S. | 53 | 67 | 14 | 18 | 8 | 10 | 4 | 5 | – | – | 73 | 152 | 42 | 53 | 37 | 46 | 1 | 1 | – | – | 72 |
| | Total | 346 | 46 | 271 | 36 | 100 | 13 | 36 | 5 | 2 | – | 187 | 942 | 500 | 65 | 246 | 32 | 8 | 1 | 13 | 2 | 175 |

*Excludes those who accepted postdoctoral fellowships, traineeships, or other postdoctoral study.
Percentages based on total known type of employer or type of primary work activity.
SOURCE: National Research Council, Office of Scientific Personnel, Doctorate Records File.

**TABLE 15c.**
**Immediate postdoctoral employment for FY 1967–1969 doctorate recipients (excluding those in postdoctoral training*) in 7 bioscience fields, NIGMS-supported vs. non-NIGMS-supported.**

| Field of PhD | Support Status in Grad. School | Type of Employer (%) | | | | | | Total Eligible for Empl. N | Type of Primary Work Activity (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Educ. Inst. | Indus/ Self | Govt | Non Prof. | Other | Un-known N | | Res. | Tchng | Admin. | Other | Un-known N |
| Anatomy | NIGMS | 96 | 1 | 1 | 0 | 1 | 22 | 100 | 32 | 63 | 2 | 3 | 18 |
| | Non-NIGMS | 89 | 2 | 4 | 2 | 2 | 13 | 103 | 36 | 57 | 4 | 3 | 5 |
| Biochemistry | NIGMS | 54 | 24 | 12 | 10 | 0 | 70 | 268 | 67 | 25 | 1 | 7 | 51 |
| | Non-NIGMS | 52 | 22 | 13 | 9 | 3 | 114 | 423 | 71 | 24 | 1 | 4 | 61 |
| Biophysics | NIGMS | 70 | 17 | 9 | 2 | 2 | 20 | 73 | 64 | 34 | 0 | 2 | 15 |
| | Non-NIGMS | 56 | 6 | 29 | 8 | 2 | 15 | 67 | 59 | 26 | 9 | 7 | 9 |
| Genetics | NIGMS | 92 | 2 | 5 | 1 | 0 | 16 | 82 | 36 | 62 | 0 | 2 | 10 |
| | Non-NIGMS | 72 | 12 | 12 | 2 | 2 | 79 | 198 | 63 | 35 | 0 | 2 | 29 |
| Microbiology | NIGMS | 67 | 15 | 10 | 8 | 0 | 41 | 194 | 53 | 37 | 2 | 8 | 30 |
| | Non-NIGMS | 53 | 15 | 22 | 5 | 5 | 100 | 456 | 58 | 33 | 2 | 7 | 59 |
| Pharmacology | NIGMS | 53 | 27 | 18 | 2 | 0 | 27 | 120 | 67 | 25 | 1 | 7 | 18 |
| | Non-NIGMS | 51 | 33 | 10 | 3 | 3 | 31 | 107 | 58 | 33 | 3 | 6 | 19 |
| Physiology | NIGMS | 72 | 12 | 12 | 3 | 1 | 36 | 210 | 50 | 44 | 1 | 4 | 26 |
| | Non-NIGMS | 73 | 7 | 11 | 5 | 4 | 55 | 296 | 50 | 43 | 3 | 3 | 28 |
| Total All Flds | NIGMS | 68 | 16 | 10 | 5 | 1 | 232 | 1,047 | 55 | 38 | 1 | 7 | 168 |
| | Non-NIGMS | 61 | 15 | 15 | 5 | 4 | 407 | 1,650 | 59 | 35 | 2 | 4 | 210 |

*Excludes those who accepted postdoctoral fellowships, traineeships, or other postdoctoral study. Please note from Table 7b that 54% of the NIGMS doctorate recipients and 32% of the non-NIGMS doctorate recipients continue with immediate postdoctoral study. Exclusion of these large percentages of persons, who are *not* randomly selected, makes interpretation of these data difficult. The type of employer and work activity for the excluded group may differ markedly from this group.

SOURCE: NIGMS: Statement of Appointment of Trainees, and Fellowship Award Statement

**TABLE 15d.**
**Type of employer and type of primary work activity for employed doctoral scientists* in the National Register of Scientific and Technical Personnel, 1960–1968**

| | Type of Employer | | | | | | | | | | Type of Work Activity | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Educ. Inst. | | Indus. & Self | | Gov't | | NonProf. | | Unknown & Other | | Total | | Research | | Teaching | | Admin. | | Unknown & Other | |
| Field/Year | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| Biosciences | | | | | | | | | | | | | | | | | | | | |
| 1960 | 9,337 | 64 | 1,770 | 12 | 2,250 | 15 | 747 | 5 | 530 | 4 | 14,634 | 100 | 7,188 | 49 | 4,334 | 30 | 2,308 | 16 | 804 | 5 |
| 1962 | 9,263 | 63 | 1,676 | 11 | 2,563 | 17 | 693 | 5 | 515 | 4 | 14,710 | 100 | 7,249 | 49 | 4,462 | 30 | 2,278 | 15 | 721 | 5 |
| 1964 | 10,288 | 65 | 1,706 | 11 | 2,362 | 15 | 718 | 5 | 648 | 4 | 15,722 | 100 | 7,250 | 46 | 4,573 | 29 | 2,638 | 17 | 1,261 | 8 |
| 1966 | 11,535 | 66 | 1,896 | 11 | 2,528 | 14 | 848 | 5 | 721 | 4 | 17,528 | 100 | 8,099 | 46 | 4,851 | 28 | 3,049 | 17 | 1,529 | 9 |
| 1968 | 16,559 | 67 | 2,440 | 10 | 3,409 | 14 | 1,270 | 5 | 998 | 4 | 24,676 | 100 | 12,037 | 49 | 6,756 | 27 | 4,059 | 16 | 1,824 | 7 |
| Physical Sciences | | | | | | | | | | | | | | | | | | | | |
| 1960 | 13,663 | 39 | 14,990 | 43 | 2,940 | 8 | 2,341 | 7 | 723 | 2 | 34,657 | 100 | 17,193 | 50 | 7,984 | 23 | 7,702 | 22 | 1,778 | 5 |
| 1962 | 15,007 | 41 | 15,004 | 41 | 3,327 | 9 | 2,393 | 7 | 947 | 3 | 36,678 | 100 | 17,520 | 48 | 9,045 | 24 | 7,971 | 22 | 2,142 | 6 |
| 1964 | 18,615 | 45 | 16,190 | 39 | 3,473 | 8 | 1,872 | 5 | 1,389 | 3 | 41,539 | 100 | 19,869 | 48 | 9,909 | 24 | 8,167 | 19 | 3,594 | 9 |
| 1966 | 22,424 | 48 | 16,826 | 36 | 3,807 | 8 | 2,037 | 4 | 2,073 | 4 | 47,167 | 100 | 22,043 | 47 | 11,387 | 24 | 8,802 | 19 | 4,935 | 10 |
| 1968 | 27,629 | 48 | 20,890 | 37 | 4,246 | 7 | 1,689 | 3 | 2,627 | 5 | 57,081 | 100 | 24,469 | 43 | 14,845 | 26 | 11,427 | 20 | 3,340 | 1 |
| Social Sciences | | | | | | | | | | | | | | | | | | | | |
| 1960 | (Data on the social sciences not available on a comparable basis for 1960 and 1962) | | | | | | | | | | | | | | | | | | | |
| 1962 | | | | | | | | | | | | | | | | | | | | |
| 1964 | 11,671 | 62 | 2,206 | 12 | 2,633 | 14 | 1,326 | 7 | 1,006 | 5 | 18,842 | 100 | 3,888 | 21 | 7,107 | 38 | 3,421 | 18 | 4,426 | 23 |
| 1966 | 14,436 | 64 | 2,302 | 10 | 3,016 | 13 | 1,476 | 7 | 1,245 | 6 | 22,475 | 100 | 4,781 | 21 | 8,341 | 37 | 4,296 | 19 | 5,057 | 23 |
| 1968 | 20,436 | 69 | 2,714 | 9 | 3,106 | 11 | 1,978 | 7 | 1,215 | 4 | 29,449 | 100 | 5,884 | 20 | 12,301 | 42 | 5,583 | 19 | 5,681 | 19 |

*Table 15a describes *immediate* postdoctoral employment as reported in the Survey of Earned Doctorates. This table describes employment of *all* employed doctoral scientists for various years of work experience as reported to the National Register of Scientific and Technical Personnel.

SOURCE: National Science Foundation, *American Science Manpower*

**TABLE 15e.**
**Primary work activity, in 1967, of all M.D. graduates of U.S. medical schools as reported to the American Medical Association's Physician Records Service file.**

| | Number | Percent |
|---|---|---|
| Total graduates from U.S. Medical Schools, all years | 256,536 | 100.0 |
| Primary Work Activity in 1967 | | |
| *Patient Care* | 228,337 | 89.0 |
| (Solo, partnership, group) | (168,469) | (65.7) |
| (Interns, residents, fellows) | (31,226) | (12.2) |
| (Hospital staff) | (28,642) | (11.2) |
| *Other Professional Activities* | 16,452 | 6.4 |
| (Medical school faculty) | (9,401) | (3.7) |
| (Administration) | (3,806) | (1.5) |
| (Research) | (3,245) | (1.3) |
| *Inactive* | 11,747 | 4.6 |

SOURCE: *Medical School Alumni, 1967*, p. 24.

## Section 16:
### Salary

- Salary data reported from the National Register of Scientific and Technical Personnel do not provide sufficient detail to make adequate comparisons between fields. Median salary for PhD's in a field equated for type of employer, type of work activity, and years of professional experience is not available from the published tabulations.
- The median annual salaries of bioscientists are about the same as those of social science PhD's, but they are somewhat less than the median annual salaries of physical scientists. However, these differences are decreasing because the rate of increase for the physical sciences is less somewhat than for the other two.
- In educational institutions the median salary of bioscientists compares favorably with those of chemists, physicists, and mathematicians. In industry, government, and nonprofit institutions the biosciences lag the others.

Figure 16.
Median annual salaries in 1968 of research doctorates in 4 natural science fields by type of employer.

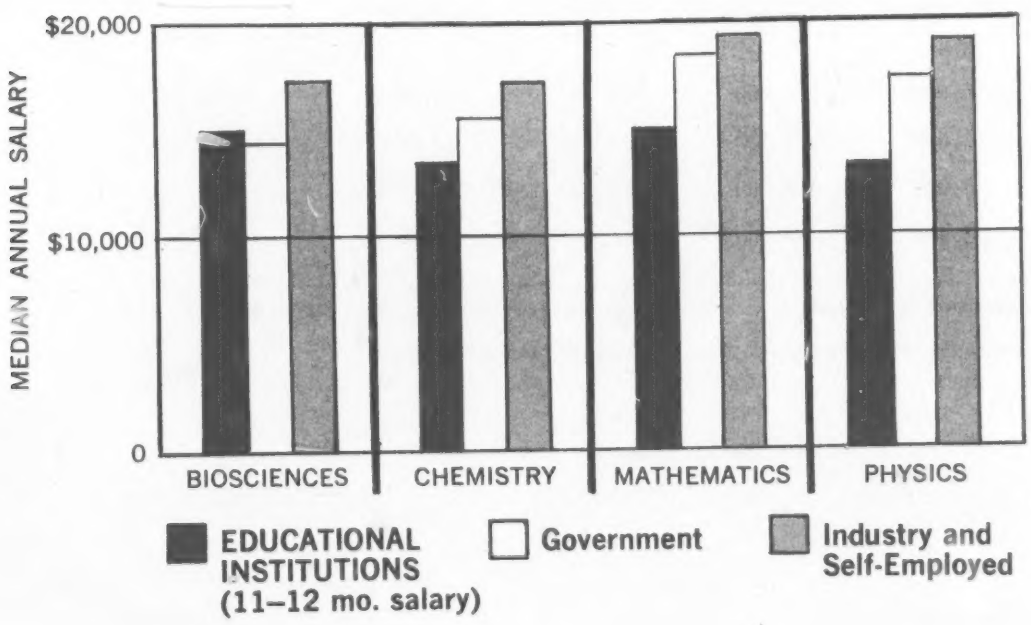


**TABLE 16a.**
**Median Annual Salaries of Research Doctorates in the Life, Physical and Social Sciences as Reported to the National Register of Scientific and Technical Personnel, Biennially 1960–1968.**

| Field | | 1960 | 1962 | 1964 | 1966 | 1968 |
|---|---|---|---|---|---|---|
| Life | Median Annual Salary | $ 9,000 | $10,000 | $11,200 | $12,500 | $14,200 |
| Sciences | % Increment Above Previous Period | | 11.1 | 12.0 | 11.6 | 13.6 |
| Physcial | Median Annual Salary | 11,000 | 12,000 | 12,600 | 13,800 | 15,400 |
| Sciences | % Increment Above Previous Period | | 9.1 | 5.0 | 9.5 | 15.9 |
| Social | Median Annual Salary | 9,000 | 10,000 | 11,200 | 12,400 | 14,300 |
| Sciences | % Increment Above Previous Period | | 11.1 | 12.0 | 10.7 | 15.3 |

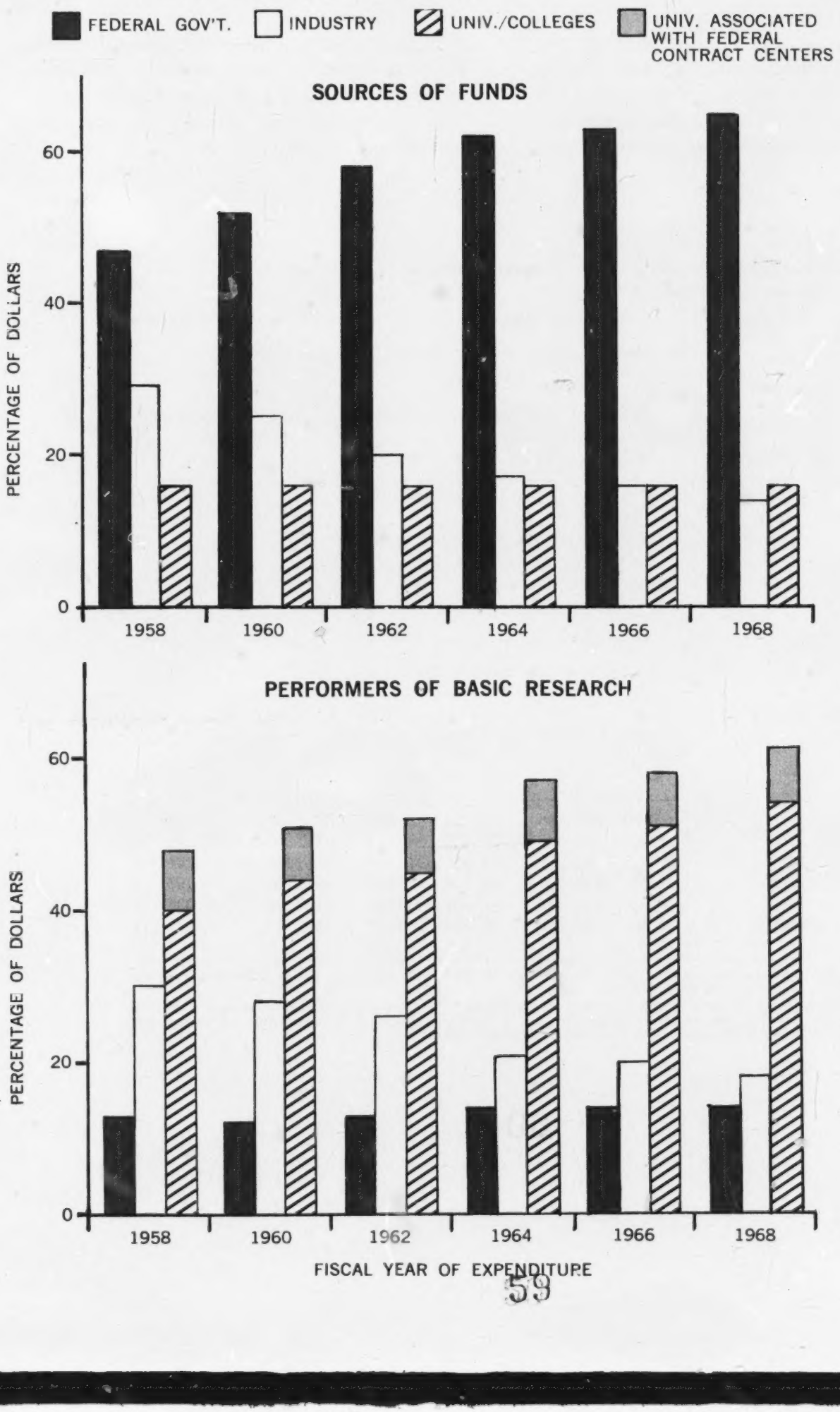
Notes: Salaries were reported to the nearest thousand dollars in 1960 and 1962. No specifications after 1962.
The fields included in the three summary fields are approximately the same from year to year for the life and physical sciences. The social science fields increase from one in 1960 (psychology) to six in 1968.

**TABLE 16b.**
**Median Annual Salaries of Research Doctorates, by Type of Employer, by Field of Science, 1968 National Register of Scientific and Technical Personnel.**

| Scientific Field | Educatonal Institutions[a] | Industry and Self-employed | Government | Non-profit Organization | Other & Unknown |
|---|---|---|---|---|---|
| Biosciences | $15,000 | $17,200 | $14,400 | $15,000 | $16,000 |
| Chemistry | 13,500 | 17,100 | 15,600 | 16,000 | 15,200 |
| Mathematics | 15,000 | 19,600 | 18,400 | 20,000 | 18,000 |
| Physics | 13,400 | 19,000 | 17,400 | 18,000 | - - - |

[a]Salaries of scientists employed by educational institutions are based on calendar year (11-12 months) salaries.
SOURCE: National Science Foundation, *American Science Manpower* (biennial series)

**Figure 17.**—Sources of funds and performers of basic research biennially 1958–1968.



- In absolute amounts, all types of agencies increased their contributions to, and use of, funds for basic research during the past decade. Industry and nonprofit organizations performed roughly the same amount of basic research as they financed; the Federal government was a source of five times as much funding as it used, and the universities performed about three times as much basic research as they funded.
- As a percentage of the total, the Federal government has been an increasing source of funds for basic research, and industry has provided a decreasing percentage of the total. As performers of basic research, the educational institutions accounted for an increasing percentage and industry a decreasing percentage of the total.

**TABLE 17.**
**Transfers of funds expended annually for performance of basic research by sector, distributed by source, 1958–1968.**

| | | Sources of Funds for Basic Research* (Dollars in millions) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | Fed. Govt. | | Industry | | Univ. & Colleges | | Non-Profit | |
| FY of | Expenditure | $ | % | $ | % | $ | % | $ | % | $ | % |
| | 1958 | 973 | 100 | 460 | 47 | 282 | 29 | 159 | 16 | 72 | 8 |
| | 1960 | 1326 | 100 | 693 | 52 | 331 | 25 | 215 | 16 | 87 | 7 |
| | 1962 | 1886 | 100 | 1094 | 58 | 382 | 20 | 293 | 16 | 120 | 6 |
| | 1964 | 2560 | 100 | 1593 | 62 | 425 | 17 | 402 | 16 | 140 | 5 |
| | 1966 | 3135 | 100 | 1988 | 63 | 496 | 16 | 494 | 16 | 157 | 5 |
| (prel) | 1968 | 3730 | 100 | 2405 | 65 | 525 | 14 | 615 | 16 | 185 | 5 |

| | | Performers of Basic Research (Dollars in millions) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | Fed. Govt. | | In-dustry | | Univ. & Colleges | | Univ. Assoc. Contr. Cntr. | | Non-Profit | |
| | | $ | % | $ | % | $ | % | $ | % | $ | % | $ | % |
| | 1958 | 973 | 100 | 126 | 13 | 295 | 30 | 390 | 40 | 78 | 8 | 84 | 9 |
| | 1960 | 1326 | 100 | 160 | 12 | 376 | 28 | 576 | 44 | 97 | 7 | 117 | 9 |
| | 1962 | 1886 | 100 | 251 | 13 | 488 | 26 | 850 | 45 | 136 | 7 | 161 | 9 |
| | 1964 | 2560 | 100 | 364 | 14 | 549 | 21 | 1261 | 49 | 191 | 8 | 195 | 8 |
| | 1966 | 3135 | 100 | 449 | 14 | 624 | 20 | 1601 | 51 | 227 | 7 | 234 | 7 |
| (prel) | 1968 | 3730 | 100 | 515 | 14 | 680 | 18 | 1990 | 54 | 275 | 7 | 270 | 7 |

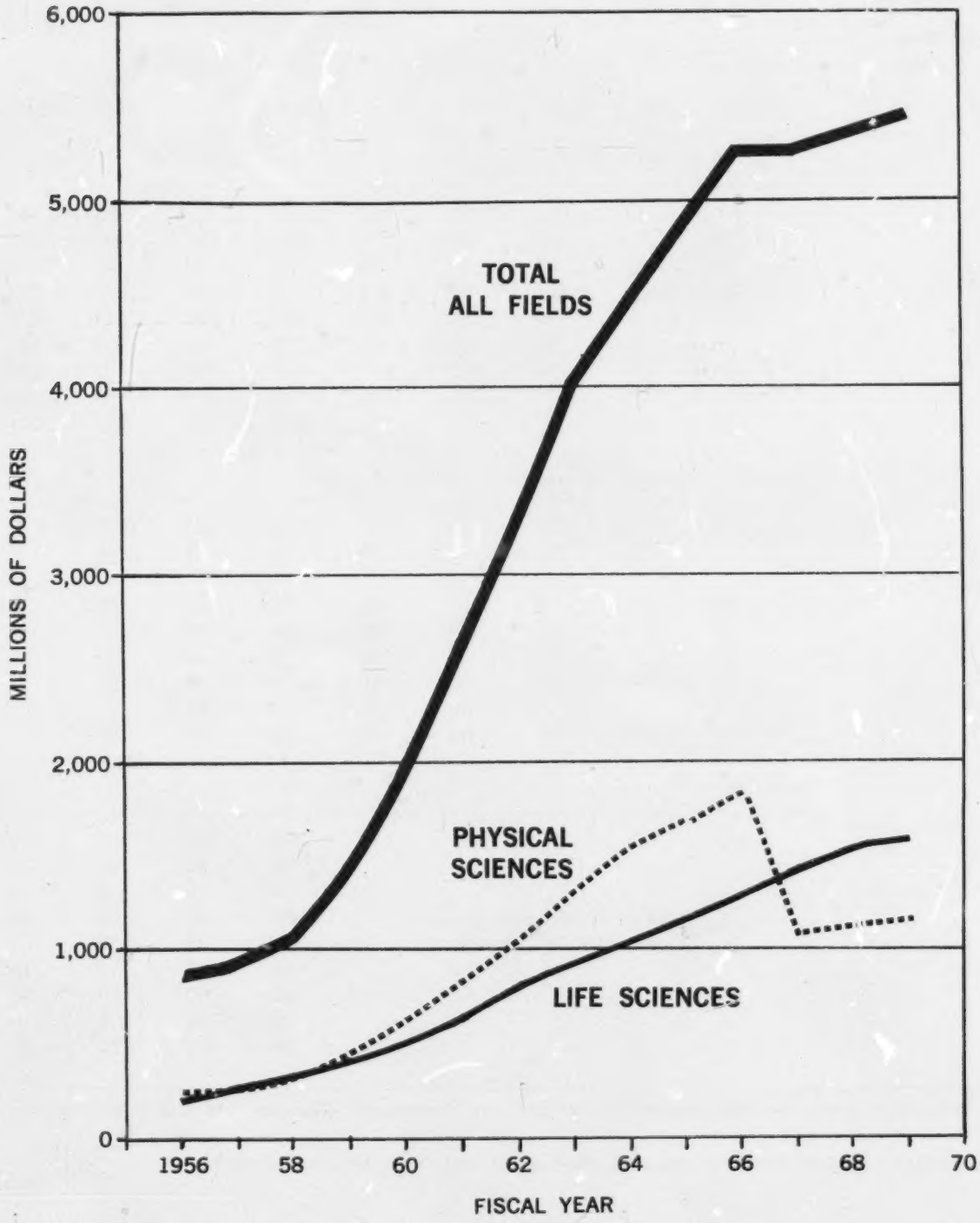
**SOURCE:** National Science Foundation, *National Patterns of R&D Resources, Funds & Manpower in the United States, 1953-1970*, NSF 69-30, 1969.

***Basic research is defined as that directed toward increases of knowledge in science with "the primary aim of the investigator . . . a fuller knowledge of understanding of the subject under study, rather than a practical application thereof."**

## Section 18:
### Federal funds for research

**Figure 18.**

Federal funds for research in the life sciences, physical sciences, and total all fields, FY 1956–1969.




- Federal funding of basic and applied research increased rapidly from FY 1958 through FY 1966, but since then it has leveled off in absolute amount.

Physical sciences were cut back drastically; life sciences continued to receive increasing support.

- Reductions in research support in the physical sciences were caused by sharp cutbacks in research funding by NASA and DoD. These two agencies accounted for 70% of the Federal research funding for physical sciences in FY 1966. The life sciences receive almost two-thirds of their Federal research support from HEW, and this support has continued to increase—but at a decreasing rate--through FY 1969.

**TABLE 18.**
**Federal Obligations for Basic and Applied Research, by Source Agency, By Field of Science, FY 1961–1969**

**Millions of Dollars by Fiscal Year**

| Source Agency | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968* | 1969** |
|---|---|---|---|---|---|---|---|---|---|
| | Total All Fields | | | | | | | | |
| Total, All Agencies | 2,620 | 3,273 | 4,041 | 4,464 | 4,854 | 5,271 | 5,273 | 5,365 | 5,447 |
| Dept. Agriculture | 138 | 150 | 160 | 182 | 218 | 228 | 237 | 239 | 247 |
| Dept. Commerce | 27 | 29 | 36 | 39 | 44 | 41 | 51 | 56 | 63 |
| Dept. Defense | 885 | 1,008 | 1,632 | 1,771 | 1,751 | 1,849 | 1,591 | 1,577 | 1,633 |
| Dept. HEW | 427 | 574 | 653 | 772 | 862 | 966 | 1,082 | 1,147 | 1,208 |
| Dept. Interior | 70 | 82 | 76 | 90 | 98 | 121 | 143 | 152 | 162 |
| Atomic Energy Comm. | 220 | 247 | 281 | 308 | 334 | 371 | 392 | 402 | 420 |
| NASA | 453 | 714 | 1,005 | 1,147 | 1,290 | 1,358 | 1,379 | 1,356 | 1,245 |
| Natl Science Fndn | 77 | 105 | 144 | 164 | 172 | 224 | 241 | 257 | 247 |
| | Biological Sciences (excl. Med. & Agric.) | | | | | | | | |
| Total, All Agencies | 129 | 145 | 185 | 220 | 258 | 370 | 434 | 454* | |
| Dept. Agriculture | 15 | 11 | 12 | 18 | 20 | 22 | 27 | 28 | |
| Dept. Commerce | | | | | | | | | |
| Dept. Defense | 29 | 31 | 46 | 54 | 49 | 42 | 51 | 41 | |
| Dept. HEW | 13 | 15 | 17 | 20 | 26 | 119 | 138 | 151 | |
| Dept. Interior | 20 | 19 | 23 | 22 | 26 | 35 | 37 | 44 | |
| Atomic Energy Comm. | 28 | 31 | 35 | 39 | 41 | 45 | 49 | 50 | |
| NASA | 2 | 17 | 17 | 30 | 50 | 62 | 71 | 74 | |
| Natl Science Fndn. | 24 | 26 | 34 | 39 | 43 | 41 | 55 | 58 | |
| | Chemistry | | | | | | | | |
| Total. All Agencies | 134 | 165 | 196 | 233 | 233 | 258 | 242 | 239 | 256 |
| Dept. Agriculture | | | | | | 30 | 28 | 27 | 28 |
| Dept. Commerce | | | | | | 5 | 5 | 5 | 6 |
| Dept. Defense | (Detail by agency not available | | | | | 89 | 68 | 66 | 78 |
| Dept. HEW | prior to 1966 in Chemistry) | | | | | 32 | 33 | 36 | 37 |
| Dept. Interior | | | | | | 16 | 17 | 14 | 16 |
| Atomic Energy Comm | | | | | | 56 | 60 | 60 | 63 |
| NASA | | | | | | 10 | 8 | 6 | 6 |
| Natl Science Fndn. | | | | | | 19 | 23 | 22 | 20 |

*Change in field breakout in 1968 made figures for 1968 incompatible with those for previous year. Therefore 1968 data in this field are estimated.
**Estimated
SOURCE: National Science Foundation, *Federal Funds for Research, Development, and Other Scientific Activities.*

**TABLE 18. Continued**
**Millions of Dollars by Fiscal Year**

| Source Agency | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968* | 1969** |
|---|---|---|---|---|---|---|---|---|---|
| | (Mathematical Sciences) | | | | | | | | |
| Total, All Agencies | 40 | 64 | 87 | 93 | 105 | 123 | 130 | 119 | 127 |
| Dept. Agriculture | | | | | | | | | |
| Dept. Commerce | | | | | | | | | |
| Dept. Defense | 32 | 39 | 54 | 69 | 72 | 87 | 90 | 79 | 88 |
| Dept. HEW | | | 2 | 3 | 4 | 5 | 5 | 5 | 5 |
| Dept. Interior | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Atomic Energy Comm. | 4 | 4 | 5 | 5 | 6 | 5 | 6 | 6 | 6 |
| NASA | 2 | 17 | 13 | 6 | 7 | 8 | 6 | 4 | 4 |
| Natl. Science Fndn. | 5 | 7 | 11 | 11 | 12 | 14 | 19 | 19 | 18 |
| | (Agricultural Science | | | | | | | | |
| Total, All Agencies | 63 | 71 | 76 | 80 | 106 | 109 | 114 | 1.7* | |
| Dept. Agriculture | 60 | 67 | 70 | 75 | 97 | 101 | 104 | 105 | |
| Dept. Commerce | | | | | | | | | |
| Dept. Defense | | | | | | | | | |
| Dept. HEW | | | | | | | | | |
| Dept. Interior | | 1 | | | | 2 | 1 | 2 | |
| Atomic Energy Comm. | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | |
| NASA | | | | | | | 1 | 2 | |
| Natl Science Fndn. | | | | | | | | | |
| | Physics | | | | | | | | |
| Total, All Agencies | 321 | 372 | 511 | 482 | 536 | 578 | 579 | 619 | 604 |
| Dept. Agriculture | | | | | | 2 | 3 | 4 | 4 |
| Dept. Commerce | | | | | | 10 | 11 | 11 | 12 |
| Dept. Defense | | | | | | 228 | 207 | 237 | 207 |
| Dept. HEW | | | | | | | | | |
| Dept. Interior | | | | | | 2 | 3 | 3 | 4 |
| Atomic Energy Comm. | | | | | | 193 | 209 | 217 | 229 |
| NASA | | | | | | 120 | 114 | 108 | 111 |
| Natl Science Fndn. | | | | | | 23 | 22 | 38 | 36 |

*Change in field breakout in 1968 made figures for 1968 incompatible with those for previous years. Therefore the 1968 data in this field are estimated.
**Estimated
SOURCE: National Science Foundation, *Federal Funds for Research, Development and Other Scientific Activities*

**TABLE 18. Continued**
**Millions of Dollars by Fiscal Year**

| Source Agency | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968* | 1969** |
|---|---|---|---|---|---|---|---|---|---|
| | Physical Sciences | | | | | | | | |
| Total, All Agencies | 855 | 1,022 | 1,330 | 1,590 | 1,694 | 1,842 | 1,074 | 1,131 | 1,150 |
| Dept. Agriculture | 24 | 27 | 30 | 39 | 42 | 42 | 38 | 38 | 38 |
| Dept. Commerce | 15 | 18 | 23 | 24 | 25 | 27 | 15 | 16 | 18 |
| Dept. Defense | 378 | 380 | 511 | 587 | 547 | 542 | 327 | 338 | 325 |
| Dept. HEW | 5 | 2 | 13 | 15 | 20 | 39 | 41 | 45 | 46 |
| Dept. Interior | 29 | 34 | 29 | 37 | 41 | 47 | 21 | 18 | 21 |
| Atomic Energy Comm. | 144 | 165 | 188 | 208 | 226 | 263 | 268 | 277 | 292 |
| NASA | 25 | 316 | 494 | 611 | 709 | 752 | 289 | 317 | 331 |
| Natl Science Fndn. | 32 | 44 | 64 | 74 | 81 | 123 | 70 | 77 | 75 |
| | Life Sciences, Total | | | | | | | | |
| Total, All Agencies | 635 | 820 | 933 | 1,060 | 1,183 | 1,290 | 1,451 | 1,537 | 1,597 |
| Dept. Agriculture | 8. | 91 | 95 | 108 | 136 | 142 | 150 | 150 | 154 |
| Dept. Commerce | | | | | | | | | |
| Dept. Defense | 52 | 58 | 93 | 98 | 99 | 107 | 106 | 105 | 107 |
| Dept. HEW | 380 | 523 | 568 | 662 | 714 | 777 | 878 | 951 | 997 |
| Dept. Interior | 20 | 20 | 23 | 22 | 28 | 37 | 41 | 43 | 48 |
| Atomic Energy Comm. | 45 | 50 | 56 | 62 | 67 | 72 | 78 | 79 | 81 |
| NASA | 4 | 17 | 21 | 32 | 51 | 67 | 88 | 98 | 88 |
| Natl Science Fndn | 26 | 32 | 42 | 44 | 44 | 42 | 58 | 57 | 56 |
| | Medical Sciences | | | | | | | | |
| Total, All Agencies | 443 | 604 | 672 | 761 | 819 | 811 | 903 | 1,016* | |
| Dept. Agriculture | 10 | 13 | 13 | 15 | 19 | 19 | 20 | 20 | |
| Dept. Commerce | | | | | | | | | |
| Dept. Defense | 23 | 27 | 46 | 43 | 50 | 64 | 55 | 52 | |
| Dept. HEW | 367 | 509 | 551 | 642 | 688 | 658 | 740 | 819 | |
| Dept. Interior | | | | | | | 2 | 2 | |
| Atomic Energy Comm. | 15 | 17 | 19 | 21 | 23 | 25 | 27 | 28 | |
| NASA | 2 | | 4 | 2 | | 5 | 16 | 47 | |
| National Science Fndn | 2 | 6 | 8 | 5 | 1 | 1 | 2 | 2 | |

*Change in field breakout in 1968 made figures for 1968 incompatible with those for previous years. Therefore 1968 data in this field are estimated.
**Estimated

SOURCE: National Science Foundation, *Federal Funds for Research, Development, and Other Scientific Activities.*

Chapter III

# ANNOTATED BIBLIOGRAPHY OF SOURCE DOCUMENTS

The data presented in the preceding chapter are generally in time-series form, terminating at about FY 1969. However, most of the data appearing in the tables were obtained from sources which periodically repeat their surveys and report the results regularly in data booklets. The reader may up-date the information in this report by subscribing to these booklets, most of which are publications from government agencies. This chapter provides an annotated listing of the source publications cited in Chapter Two.

The source documents are listed by subject grouping—"Population", "High School Enrollments and Graduates", "Higher Education Enrollments", etc. Within each category, a source agency is identified followed by the publication(s) from that agency dealing with the subject. A short statement describing the method of data collection is also provided.

***Population***

Source Agency: U.S. Department of Commerce
Bureau of the Census
Population Division

Source Publication(s):

*Population Estimates,* "Estimates of the Population of the United States, by Single Years of Age, Color, and Sex, 1900 to 1959". (Series P–25, No. 311, July 2, 1965)

—data by single years of age were not published prior to this report.

*Population Estimates,* "Estimates of the Population of the United States, by Single Years of Age, Color, and Sex, 1960 to 1964." (Series P–25, No. 314, April 19, 1965)

*Population Estimates,* "Estimates of the Population of the United States, by Age, Race, and Sex: July 1, 1964 to 1967." (Series P–25, No. 385, February 14, 1968)

*Population Estimates,* "Projections of the Population of the United States, by Age, Sex, and Color to 1990, with Extensions of Population by Age and Sex to 2015." (Series P–25, No. 381, December 18, 1967)

***Method of Data Collection:***

The estimates for single years of age, by color and sex are published annually. Each publication includes population data as of the preceding July 1st and several years prior (the number of years for which data are presented varies in the annual reports). The estimates for the fifties and sixties are based of the census counts taken in April and adjusted to July 1 of the census year. "The population count is brought from the census year to the estimate date by aging the population according to the length of the estimate period and by assigning births, deaths, and net immigrants during the estimate period to the proper age group." A note to the estimates in single years of age indicates that they "are subject to considerable error". "They represent very approximately the size of the population in a given age and reflect very roughly variations from age to age and year to year."

The projections of the population by age, sex, and color are published periodically—no specific time interval. The most recent projections are those in the above cited publication.

The projections are based on the 1960 Census data and carried forward to July 1, 1965 by employing birth, death, and net immigration statistics for the intervening years. The population in midyear 1966 was continued forward by use of life-table survival rates and allowances for net immigration. The projections for cohorts born after midyear 1966 depend on births for each year. The Census bureau uses four fertility rates, i.e., average number of children born by the end of childbearing period per 1000 women. Series A uses a 3.4 rate, B uses a 3.1, C a 2.8, and D a 2.4 rate.

Series A and B are not used extensively. The Population Division makes short-range projec-

tions based on the Series D (2.4) rate and long-range projections using the Series C (2.8) rate.

### *High School: Enrollments and Graduates*

Source Agency: U.S. Department of Health, Education, and Welfare
Office of Education
National Center for Educational Statistics

Source Publications:

"Offerings and Enrollments in Science and Mathematics in Public High Schools."

"Digest of Educational Statistics, 1969"

"Projections of Educational Statistics to 1977–78"

Method of Data Collection:

Enrollments in public high school science and mathematics programs were obtained from biennial surveys conducted from 1954 to 1964. A twenty percent stratified sample of public high schools in the U.S. were surveyed. The sample data were inflated to provide national *estimates.*

The number of high school graduates includes graduates of all regular public and non-public schools. The data on public school graduates are obtained each fall from the State departments of education. Graduates of non-public schools are reported in surveys of non-public schools by the Office of Education.

### *HEGIS*

The Higher Education General Information Survey (HEGIS) of the U.S. Office of Education annually collects data from all accredited institutions of higher education. It combines into one package surveys which, prior to 1966, were sent to colleges and universities at differing times in the year.

The basic HEGIS package covers the following areas of information:

1. Institutions—characteristics of colleges and universities
2. Students—enrollments and degrees
3. Employees—professional and nonprofessional
4. Financial statistics
5. Physical facilities

HEGIS is mailed in April to the presidents of academic institutions for distribution to the person or office who maintains the institutional records for each portion of the survey questionnaire. The survey obtains information for the fiscal year (July 1 through June 30) following the April mail-out. The various sections of the survey are scheduled to be returned to OE from July to December.

All data collected by HEGIS are published and reports are available for purchase from the Government Printing Office. The period of time from data collection to publication varies considerably. In the following sections the frequency of collection for specific information items and the most recent publication of the data will be given.

### *Higher Education: Enrollments*

Source Agencies: U.S. Department of Health, Education, and Welfare
Office of Education
National Center for Educational Statistics

American Council on Education
Washington, D.C.

Source Publications:

"Opening Fall Enrollment in Higher Education" Office of Education series OE 54003

"Students Enrolled for Advanced Degrees" Office of Education series OE 54019

"Projections of Educational Statistics to 1977–78" Office of Education series OE 10030

"A Fact Book on Higher Education" American Council on Education

Method of Data Collection:

The "Fact Book" is a compilation of data collected from various sources and published annually by the American Council on Education. The booklet is prepared in four sections

which present selected statistics on (1) enrollment data (2) population, business activity, and employment (3) institutions, faculty and staff, student characteristics and finances and (4) earned degrees. The data in these sections are updated annually.

Undergraduate and graduate enrollments are collected annually by the Office of Education in their HEGIS package. The institutional response to this portion of the survey is nearly 100%. The most recent available data are included for any institutions that do not respond. The 1968 "Opening Fall Enrollment" and "Students Enrolled for Advanced Degrees" were published in the first half of 1970.

The projections of enrollments by the Office of Education are based on 1957–58 to 1967–68 data. The projections assume that the trends in enrollment rates for the past ten-year period will continue for the next ten years.

***Higher Education: Degrees***

Source Agencies: U.S. Department of Health, Education and Welfare
Office of Education
National Center for Educational Statistics

National Research Council
Office of Scientific Personnel

Source Publications:
"Earned Degrees Conferred"
Office of Education series OE 54013

"Doctorate Recipients from United States Universities, 1958–1966"

"Summary Report 1967: Doctorate Recipients from United States Universities"; "Summary Report 1968 . . ."; "Summary Report 1969 . . ."

Method of Data Collection:

The Office of Education annually obtains information on degrees (associate degrees and other formal degrees below the baccalaureate, bachelor's, master's, doctor's and first professional degrees) from the college or university registrars. The information is collected as part of the HEGIS package. The institutions' responses to the degree portion of the survey is, as is the case for the enrollment section, nearly 100%. Nonrespondents to the degree portion of the survey are listed in each publication, and data from the last report made by the institution are used.

The Office of Scientific Personnel collects information on research doctorates only by its Survey of Earned Doctorates. Questionnaires are annually sent to the graduate deans of doctorate-granting institutions. The questionnaire form is filled out by each doctorate recipient after he has completed all requirements for his degree. The response rate is better than 98%. Information about nonrespondents is obtained from the universities' commencement programs.

***Higher Education: Institutions***

Source Agencies: U.S. Department of Health, Education, and Welfare
Office of Education
National Center for Education Statistics

National Research Council
Office of Scientific Personnel

Source Publications:
"Education Directory Part 3: Higher Education" Office of Education series OE 50000

"Doctorate Recipients from United States Universities, 1958–1966" and "Summary Report" for 1967, 1968, and 1969

Method of Data Collection:

The Office of Education obtains information about higher education institutions from the "Institutional Characteristics . . ." portion of HEGIS. The annual *Education Directory* contains detailed information about the institutions, i.e., type, control, enrollment, names of administrators, accreditation, etc. It also presents several tables summarizing some data

about the institutions. All institutions are included which offer at least a 2-year program of college-level studies in residence and have met specific criteria of accreditation. Several other OE publications present information by named institution, e.g., enrollments, degrees, and professional and nonprofessional employees. The 1969–70 *Education Directory* of higher educational institutions was published in June 1970.

The Office of Scientific Personnel publishes data about doctorate-granting institutions. These data are obtained from the annual Survey of Earned Doctorates referred to in the notes on higher education degrees. Institutions are included which have granted at least one doctorate; those with doctoral programs, but which have not yet granted doctorate degrees, are excluded.

***Higher Education: Academic Aptitude of Graduate Students***

Source Agency: Educational Testing Service
Princeton, New Jersey

Source Publication:

Although the Educational Testing Service administers the Graduate Record Examinations at regular intervals each year, it does not regularly publish the Aptitude Test scores (verbal and quantitative) distributed by undergraduate major or by field of the Advanced Test. The following are reports of *ad hoc* studies:

- *Graduate Record Examinations Special Report.* Report No. 65–3, August, 1965 (Reports FY 1964 data)
- *Graduate Record Examinations Special Report.* Report No. 68–2, July, 1968. (Reports FY 1968 data)

Method of Data Collection:

The Graduate Record Examinations are administered by the ETS and consist of an Aptitude Test and an Advanced Test. "The Aptitude Test measures two general abilities: verbal and quantitative aptitudes which have been found to be valuable indicators of capacity to handle graduate-level work . . . The verbal section of the Aptitude Test consists of verbal reasoning items and reading comprehension questions. The quantitative section is comprised of questions on mathematical reasoning and interpretive questions on graphic material and other descriptive data.

The Advanced Tests are achievement tests designed to measure knowledge and skills in fields commonly chosen as major fields by undergraduates."*

These examinations are not taken by all baccalaureate recipients but generally by a self-selected group who wish to use the scores as part of an application for graduate school admission or for a fellowship competition. For instance, the data reported in *Graduate Records Examinations Special Report* are based on approximately 80,000 cases, but there were approximately 460,000 baccalaureate degrees awarded in that same fiscal year (1964). Comparisons between groups using GRE results should always be made in terms of the nonrandom sample *who elected to take the examination.*

***Higher Education: Faculty***

Source Agency: U.S. Department of Health, Education, and Welfare
Office of Education
National Center for Educational Statistics

Source Publications:

"Teaching Faculty in Universities and Four-Year Colleges, Spring 1963" Office of Education series OE 53022

"Faculty and Other Professional Staff in Institutions of Higher Education, First Term 1963–64"
Office of Education series OE 53000

"Numbers and Characteristics of Employees in Institutions of Higher Education, Fall 1966"
Office of Education

Method of Data Collection:

Faculty data are currently collected as part of the HEGIS package sent by the Office of

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*p. 3 *Graduate Record Examinations Special Report.*

Education to college and university presidents. The 1966–67 and 1967–68 surveys obtained information about professional and nonprofessional employees, number of full- and part-time faculty by academic field and rank, salaries and fringe benefits. The faculty portion of the 1968 survey was a sample survey and requested only the number of full- and part-time faculty by fine field. In 1969–70, the faculty survey collected data on faculty salaries by academic rank. Information will be obtained in 1970–71 for all employees in the institutions of higher education—professional and nonprofessional, full- and part-time. The survey of employees has six parts:

1. number of employees by primary function
2. total full-time equivalents in teaching and research by academic field
3. full-time resident faculty by highest degree and academic field
4. salaries of academic deans and full-time resident faculty
5. fringe benefits for academic deans and full-time resident faculty
6. salaries of selected administrators

Responses to the faculty portion of HEGIS have been received from about 80% of the institutions. Information about factulty at nonresponding institutions is obtained from the most recent and available sources, e.g. college catalogs, AAUP, etc.

The above cited publication, "Numbers and Characteristics of Employees . . . Fall, 1966" and "Higher Education Salaries, 1966–67" are the most recent publications of faculty data collected by the Office of Education.

***Higher Education: Expenditures***

Source Agency: U.S. Department of Health, Education, and Welfare
Office of Education
National Center for Educational Statistics

National Science Foundation
National Science Board

Source Publications:
"Digest of Educational Statistics, 1969"
Office of Education series OE 10024

"Financial Statistics of Institutions of Higher Education: Current Funds Revenues and Expenditures 1965–1966"
Office of Education series OE 52010

"Graduate Education: Parameters for Public Policy" National Science Board (NSF, 1969)

Method of Data Collection:

Prior to the first HEGIS survey in 1965–66, financial data for higher educational institutions were collected and published biennially. The trend data were obtained from the "Digest" listed above.

Financial information on higher educational institutions is collected from college and university business offices as part of the HEGIS questionnaire package.

The HEGIS questionnaire is sent to all institutions of higher education. The 1965–66 survey received an 85% response rate to the financial questionnaire. In order to present national totals, ratios were applied to all data for the responding institutions. These ratios were obtained by grouping nonresponse institutions within each state by control (public or private) and by level (university, other 4-year institutions, and 2-year institutions). In 1966–67, data for nonresponding institutions (14%) were obtained from (1) each institution's response to a prior or succeeding survey and adjusted in accordance with trend information, or (2) from a peer institution's response to the 1966–67 survey. Peer institutions were selected on the basis of location, level of institution, and enrollment.

The following reports on finances result from the HEGIS survey: "Current Funds Revenues and Expenses: Property"; "Student Financial Aid"; the "Financial Statistics . . ." cited above, and "Financial Statistics of Institutions of Higher Education: Federal Funds 1965–66 and 1966–67."

The cost of graduate education was estimated by the National Science Foundation. It is derived from estimates of the cost of instruction per graduate student (based on graduate student enrollment and estimates of the portion of total Expenditures for Educational and General Purposes reported by the Office of

Education) and the expenditures for Organized Research per graduate student. Refer to "Graduate Education: Parameters . . .", pages 150–159, for a detailed description of the methodology of these costs and the projections to 1981–82.

### *Higher Education: Student Support*

Source Agency: Federal Interagency Committee on Education (FICE)
Student Support Study Group

Source Publication:
"Report on Federal Predoctoral Student Support–Part I: Fellowships and Traineeships"

Method of Data Collection:

The Federal Interagency Committee on Education was established by President Johnson in 1964 as a center of coordination for the more than 30 government agencies which administer educational programs.

FICE has collected data on the number of students supported and the amount expended by Federal agencies from 1960–61 to 1969–70. The data were obtained by questionnaire from the agencies' program administrators. The report cited above contains information collected in 1969 from all agencies supporting full-time predoctoral students on fellowships and traineeships. Part II of the report (to be published by September 1970) will present data on students supported under the institutional training grants of the National Institutes of Health and the National Institute of Mental Health.

The data in Part I, which was published in June 1970, are presented by year and academic field.

FICE previously collected data and published a report on student support. This earlier (1968) report did not include information from the Department of Housing and Urban Development, the Department of the Interior, the Social and Rehabilitation Service of the Department of Health, Education, and Welfare, and some missing components of the Public Health Service. Data from these agencies are included in the current report.

There are no definite plans as to whether there will be a continuing series of surveys on student support by FICE.

### *Employment of Doctorate Recipients*

Source Agencies: National Science Foundation
Office of Economic and Manpower Studies

National Research Council
Office of Scientific Personnel

Source Publications:
"American Science Manpower"
National Science Foundation Series

"Doctorate Recipients from United States Universities, 1958–1966"; and "Summary Report" for 1967, 1968, and 1969

Method of Data Collection:

"American Science Manpower" is a series of publications which presents data from the National Register of Scientific and Technical Personnel. The National Register has biennially collected employment information from scientists since 1954. The most recent report, published early in 1970, provides data from the 1968 Register.

The registration questionnaires are distributed with the cooperation of scientific professional societies. Information is collected from physical and biological scientists, mathematicians, and social scientists. In 1968, the Register obtained information from 298,000 scientists. According to the 1968 report, data on individual scientists constitute "partial coverage of the scientific community."

Questionnaires were received from 66% of the individuals on the mailing lists compiled by the cooperating societies; 16% of these questionnaires were eliminated from the final analyses because they were incomplete or the respondents did not have full professional qualifications.

No estimates are given on the coverage of the Register altnough the results of the study of a sample of nonrespondents are included in the appendix of the 1968 report.

"As compared with the respondents, the qualified nonrespondents:

(1) show higher proportions in chemistry and agricultural sciences and lower proportions in biological sciences and psychology;

(2) have fewer Ph.D.'s and M.D.'s and more bachelor's degrees;

(3) are more often employed in industry and business or self-employed and less often employed in educational institutions;

(4) are more likely to be in management or administration or production and inspection and less likely to be in research and development; and

(5) are somewhat older."

Employment data published by the Office of Scientific Personnel are obtained from the annual Survey of Earned Doctorates questionnaire. (See description under "Degrees.") These data describe the *immediate* postdoctoral employment of the doctorate recipients of a given year in contrast to the National Register of Scientific and Technical Personnel statistics which describe the employment characteristics of scientists with varied years of professional experience.

***Research Support***

Source Agency: National Science Foundation
Office of Economic and Manpower Studies

Source Publications:

"National Patterns of R & D Resources, 1953–1970" NSF 69–30

"Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1968, 1969, and 1970"

Method of Data Collection:

The National Patterns of R & D Resources surveys have been conducted by NSF since 1953. The reports are in the form of "Transfer Tables" or matrices which relate four pertinent sectors as sources of funds and performers of research. The four sectors are:

- Federal sector—Executive agencies surveyed annually by NSF providing data for both the National Patterns and Federal Funds reports. Return rate is 100%.
- Industry sector—all major industries surveyed annually by NSF. Forms sent to all companies with 1000 or more employees. Return rate is better than 95%.
- Universities and Colleges—surveyed biennially by NSF. All U.S. colleges and universities are sent a questionnaire. The overall return rate is approximately 80% but special efforts are made to ensure almost complete returns from the largest 100 institutions. Estimates are provided for nonrespondents.
- Other nonprofit—surveyed biennially. Forms sent to all organizations having intramural research programs of $100,000 or more. Return rate is somewhat over 80%, and estimates are made for nonrespondents.

The Federal Funds for R & D surveys are conducted by means of annual surveys of Executive Agencies by NSF. These surveys have been conducted since 1952. Although NSF staff confers with the respondent agencies, the ultimate decisions on classification of activities and the amounts reported are made by the agencies. Published reports of the data appear annually.

***Education and Employment Data for Graduates of U.S. Medical Schools***

Source Agency: Division of Medical Education
American Medical Association
535 N. Dearborn St.
Chicago, Illinois 60610

Source Publications:

Annual supplement "Medical Education in the United States" included in one of the November issues of *The Journal of the American Medical Association* (JAMA)

Medical School Alumni, 1967
C. N. Theodore, G. E. Sutter, J. N. Haug
American Medical Association, Chicago, Illinois, 1968

One of the "Special Statistical Series" published by the AMA

Method of Data Collection:

- Physician Records Service. This is a complete registry begun in 1904 of all MD's in the United States, including those graduating from U.S. medical schools and those from foreign countries. The registry includes data about each person's educational background, post-MD training, and professional employment. Each person's file is regularly updated. The data are on magnetic tape and may be considered to be virtually complete and up-to-date for each of the 1/3 million persons listed.
- Liaison Committee on Medical Education Annual Questionnaire. This questionnaire, sponsored jointly by the American Medical Association and by the Association of American Medical Colleges, is mailed out annually to each of the accredited medical colleges in the United States. The response rate is 100%. The questionnaire collects information about student enrollments, number of faculty, medical college expenditures, etc. from each accredited medical school.

Information from these sources is summarized annually in the JAMA. The reports have been published since 1908 and are quite detailed, including as much as 120 pages of tables and explanatory comment.



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